CHAPTER 4 – Innovation, Job Quality and Employment Outcomes in the Agri-food Industry: Evidence from Hungary and Spain

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1 Introduction

The fundamental role of food in the life and health of people is a well known fact, as well as its importance in the rural environment, cultural and natural heritage, landscape and gastronomy. A good part of it is contained in what is known as the agri-industrial sector, which is defined as the subgroup of the manufacturing industry which processes raw materials and intermediate products of farming, forestry and fisheries (Henson and Cranfield, 2013). The future challenges for the sector are many and highly ambitious in an ever more populated, globalised, urban world with increasingly limited resources. Innovation and sustainability play an essential role in managing to feed the 9,700 million people who are expected to inhabit the Earth in 2050.

According to Dennis et al. (2007), the capacity of the farming and food industries to continue to meet during future decades the indisputable increase in demand will depend to a large degree on fostering application of existing technologies, as well as the use of new and innovative tools which provide improvements in the processing and products. In other words, focus on innovation may signify an increase in competitiveness, improvement in quality and, therefore, assurance of the sustainability of the agri-food industry.

This innovation is understood to be in the widest sense envisaged in the Oslo Manual: not only technological innovation or that focused on products, but also in productive and commercial processes and in services, as well as in the inherent capacity of disruptive innovation to transform businesses or even create new business models.

In the European Union, the Europe 2020 strategy establishes innovation as one of its cornerstones. This same tool is the one which has contributed towards minimising the strong impact of the financial crisis and austerity measures implemented in Europe after 2008, with special effect on the Mediterranean countries.

At the same time, renovation of the sector is a need in view of a growth model which has proved its lack of sustainability and its limitations in ensuring sufficient and quality employment in recent years (Domingo et al., 2015).

Nevertheless, following the technological advances of the 20th century, we find ourselves in an era of digital transformation which some authors ensure will entail a considerable increase in productivity and which could, in turn, signify adverse effects on workers with medium/low qualification (Brynjolfsson and McAfee, 2007). The debate on the effects of digitalisation on labour markets and job quality is intense (Berger and Frey, 2016). Since the eighties, there seems to be an increasingly direct relationship between the technological change which has come about and the improvement for relatively qualified workers. Furthermore, new professions have appeared linked to this digital transformation. However, not all changes, such as salary variations across the distribution of skills, can be clearly explained (Berger and Frey, 2016).

The agri-food industry, specifically, is a sector which has been technologically stagnant in the past. In addition, traditionally certain groups of workers have had poor job quality. Despite this, even if digital technologies have been able to create only a few jobs directly, they have already had a substantial impact on qualification requirements of the new profiles created in the agri-food industry. For example, around 42% of OECD workers in all sectors are employed in companies that have introduced new technologies which have already changed work routines or skill requirements in the last 4 years (OECD, 2013).

The analysis focuses here on the interplay between innovation and job quality, and the associated employment outcomes in the agri-food industry. In this context, the ***goal*** of this chapter is to conduct an analysis of the existing interrelation between innovation and job quality in the agri-food sector based on research carried out, endeavouring to link, to the greatest possible degree, the main conclusions with those of specialised literature, thus allowing a generalisation of the results.

For such purposes, the **methodology** used follows three essential lines:

- Fieldwork (analysis on selected case studies in European Union countries in which the agri-food industry is of particular economic importance - Hungary and Spain) and the similar and different strategies which allow (based on cases of different sizes, activities within the agri-food industry and legal structure) identification of common aspects which influence on innovation management and job quality and the nexuses between both factors.
- The national industry reports elaborated by the two organisations that have developed the case studies. In addition, we have conducted interviews with industry experts. Those experts were interviewed to have a comprehensive view of the evolution of the industry and the main innovations it had undergone.
- Bibliographical analysis and review of statistical sources and studies which permit, together with support data from fieldwork, comparison of the main conclusions reached in specialised literature. The idea is to provide robustness to the conclusions and allow us to discuss which trends and interactions can be assumed to be typical for the agri-food industry in the two countries, and, possibly, in other European countries too.

The **limitations of the analysis** are basically associated to the scant specialised literature which combines the three concepts of the study; namely, innovation, job quality and agri-food industry, and also the restriction of case studies in a field of activity characterised by notable heterogeneity. These elements hinder the attainment of global conclusions at macroeconomic level for the European Union as a whole.

The text is articulated in four parts. After the introduction, the second section analyses the sector together with its job quality, within a regulatory and contextual framework, and describes the common aspects detected which have a direct influence on business management and model and, furthermore, in innovation and job quality strategies. A third section shows the motivations which prompt companies to innovate, as well as the type of innovations, the importance of a governance procedure and also explains the detected interrelations between innovation and job quality. Finally, the conclusions chapter underlines the main ideas of this study and offers a series of recommendations both for improvement of innovation management in companies and regarding regulations and policies.

2 The industry

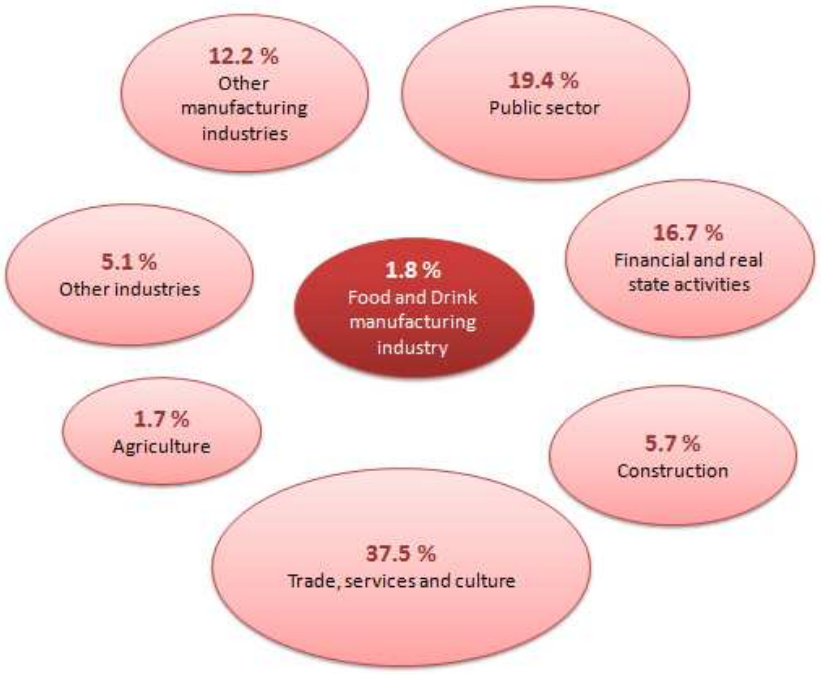
Initial knowledge of the industry and the basic context is essential in order to tackle innovation processes and their dynamics in relation to job quality.

2.1 The industry in figures

The latest FoodDrinkEurope 2016 report indicates that the agri-food industry, with a turnover of 1,089 billion Euros, is the **largest manufacturing sector** of the European Union (EU28) providing employment for 4.24 million people in the EU (Eurostat 2014). The data indicated here include the NACE rev.2 C10 category of agri-food products and C11 category of drinks. In the sector, a total of 291,854 companies conducted their business in 2014, according to Eurostat, wherein SMEs account for 49.5% of the turnover and 62.8% of employment created in the sector.

This industry signifies 1.8% of the Gross Added Value of the European Union in 2013, being one of the big contributors to the European economy, ahead of other manufacturing sectors such as the car industry.

Figure 1: Contribution of the food and drink industry to the EU economy (2013, %)



Source: Own elaboration from the data of FoodDrinkEurope, 2016

Bearing in mind these 4.24 million workers, as indicated in FoodDrinkEurope, 2016, it is one of the **employment sources** which generate the greatest number of jobs and with relative stability. Nevertheless, employment in the sector fell by 4.4% between 2008 and 2010 and 0.5% between 2010 and 2012, probably motivated by the financial crisis which hit the European Union during those years and mainly affecting countries with a certain agricultural tradition.

The EU-28 countries where these workers have a greater representation with respect to the national workforce are Croatia (6.5 % of the workforce), Poland (5.9%), Cyprus (5.7%) and Bulgaria (5.4%). The percentage of workers in the sector is lower in United Kingdom (2% of the workforce), Sweden (2%), Luxembourg (2.2%) and The Netherlands (2.6%) (Eurostat 2014).

The average number of persons employed by agri-food companies is 16, which is higher than the average in manufacturing companies (14), but considerably lower than in other sectors such as pharmaceuticals (133) or the car industry (119). On average, worker productivity is lower than in the other manufacturing sectors. The fragmentation of the sector is one of its characteristics as it will be analyzed later.

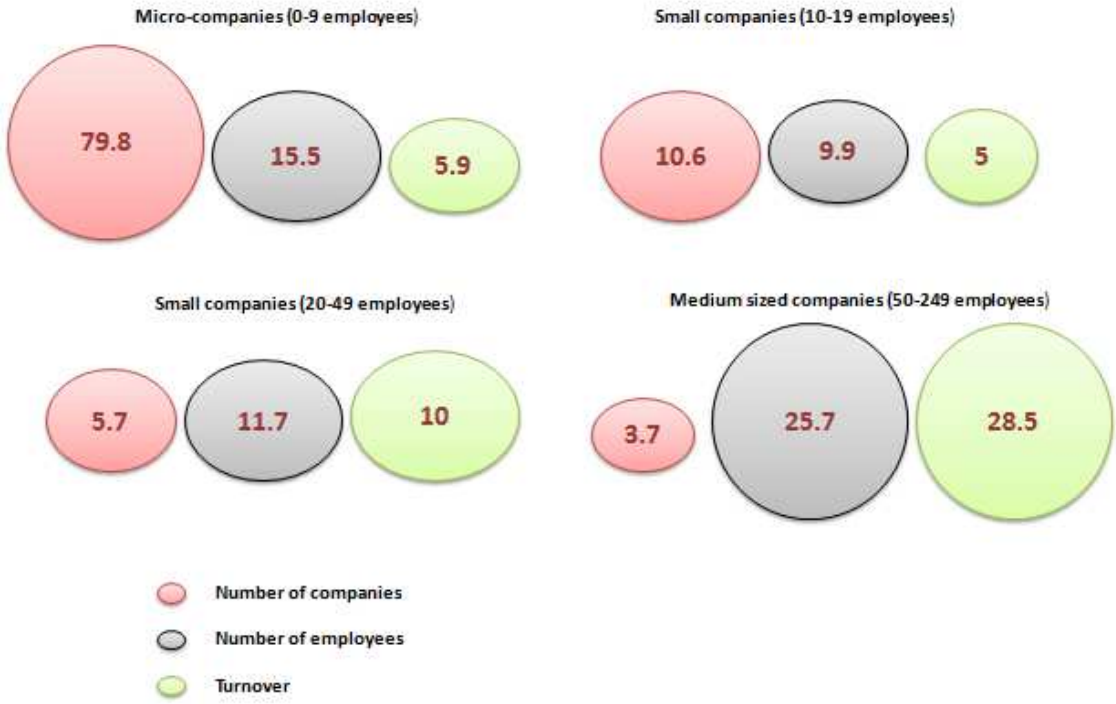
This sector is **predominantly masculine**, with 58% of male workers (Eurofound, 2015). On the other hand, the proportion of workers who have a woman as boss is of 35% in the case of women and of 8% in the case of men, which is considerably lower if compared to the European average of 47% and 12%, respectively.

The average age of workers in this sector is similar to that of the group of EU28 industries, although the proportion of young workers is slightly higher (11% as compared to 9.2% of the EU). Workers aged over 50 have a lesser representation (23% of the workforce of the agricultural industry as compared to 27% of the EU28 total (Eurostat 2013).

It is a **highly diverse industry**, comprising fruit and vegetables processing, dairy products, meat processing and drinks. The 5 main business categories which represent three quarters of the business volume and more than 80% of the total number of companies and employees are: bakery and flour-based products, meat sector, drinks and "other sundry food products".

Small and medium-sized companies generate almost 50% of the turnover and of the added value of the sector, in addition to providing employment to 2.8 million persons. Self-employment has scanty representation in the sector, 4% of the companies are self-employed workers with employees, and 4% is self-employment without employees, as compared to 4% and 11% respectively in the group of EU28 industries. The following figure shows the main characteristics of agri-food sector companies by size:

Figure 2: SMEs in the EU food and drink industry (2013, % by company size)



Source: Own elaboration from the data of FoodDrinkEurope, 2016

At Member State level, Germany, France, Italy, United Kingdom and Spain are the greatest producers of food and drink products according to turnover (Table 1) contrasting with the figures in regard to the percentage of workers in the sector indicated above. This industry is an essential part of many national economies, representing in various cases more than 15% of turnover.

Table 1: Food and drink industry data by EU member (2014)

Country	Turnover	Number of employees	Number of companies
Austria	22.040,0	79.401	3.872
Belgium	45.227,3	86.868	7.323
Bulgaria	4.944,3	90.706	5.963
Croatia	5.084,4	59.502	3.250
Cyprus	1.411,7	11.166	908
Czech Republic	13.233,3	101.928	8.926
Denmark	25.819,4	60.447	1.589
Estonia	1.870,2	15.005	525
Finland	11.153,5	38.639	1.734
France	184.546,3	593.080	62.225
Germany	191.876,9	819.223	29.731
Greece	13.237,7	76.127	14.442
Hungary	11.153,7	99.817	6.700
Ireland	26.485,3	44.746	1.634
Italy	129.121,6	343.286	56.412
Latvia	1.834,5	25.575	1.003
Lithuania	4.237,2	42.010	1.601
Luxembourg	970,5	5.344	161
Malta	-	-	384
Netherlands	68.833,8	121.808	5.639
Poland	55.440,5	395.952	13.098
Portugal	15.138,6	99.519	10.948
Romania	11.131,1	179.992	8.798
Slovakia	4.344,0	35.720	2.910
Slovenia	2.158,8	14.499	2.160
Spain	105.131,8	334.694	27.334
Sweden	18.062,0	53.939	4.008
United Kingdom	97.058,3	367.386	8.613

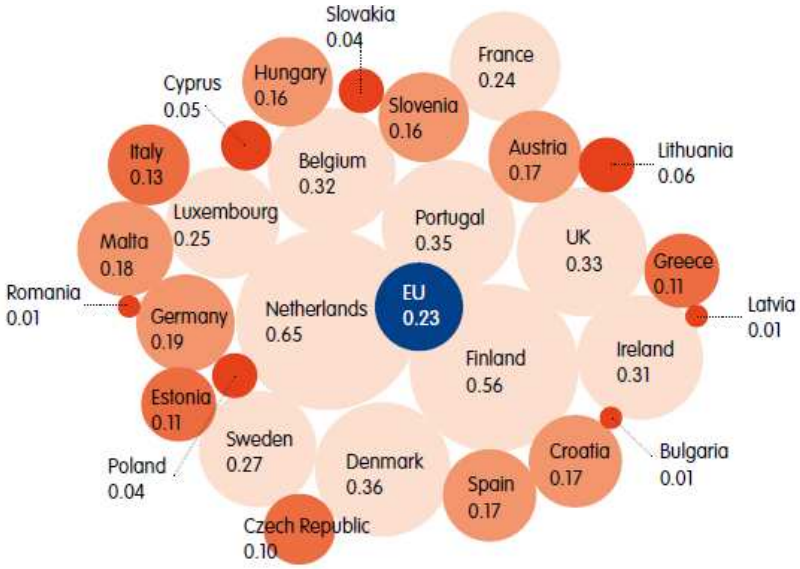
Source: Annual enterprise statistics for special aggregates of activities (NACE Rev. 2), data retrieved from Eurostat Website

Research and development expense in the agri-food industry at European level totals 2.5 billion Euros (FoodDrinkEurope, 2016). The trends which motivate innovation are the introduction of different products and the variety of sensations, as well as sophistication and easier handling.

As regards the **most innovative sub-sectors** of the European-wide agri-food industry, we can highlight the processing of convenience foods, dairy products and alcohol-free drinks. They are followed by frozen foods, processed meat and poultry, and biscuits. This shows the large number of sub-sectors which adds difficulty to the generalisation of conclusions at agri-food industry level.

Private investment of European agri-food companies in research and development is of lower intensity if compared to other international regions. In terms of private investment as a percentage of output between 2010 and 2012, Europe had an investment of 0.23% as compared to 0.73% in Japan, 0.63% in Australia and 0.57% in the United States. At European Union level, private investment in R&D goes from 0.65% in The Netherlands to 0.01% in Rumania (Figure 3)

Figure 3: Private investment of the food and drink industry in R&D as a percentage of output in the EU (2010-2012, in %)



Source: FoodDrinkEurope, 2016 and Eurostat (BERD and National Accounts) (Including tobacco)

The growth in the agri-food product market is linked to **exports**, which has doubled in the last decade reaching 98.1 billion Euros in 2015. Exports have increased by 5.2% with respect to 2014 (FoodDrinkEurope. 2016). Agri-food exports represent 7% of the goods exported by the EU, being world leader in this type of exports (European Commission 2016). A quarter of the exports have been sold to countries outside the EU, also showing an increasing rate in recent years. On the other hand, imports have increased by 6.5% with respect to 2014. NAFTA (North American Free Trade Agreement) continues to be the main trading partner of the EU, followed by EFTA (European Free Trade Association) and ASEAN (Association of South-east Asian Nations).

2.2 Working conditions and job quality in the agri-food sector

The objective of the Eurofound Working Conditions Survey is to measure working conditions in different European countries, analysing the relationship between different aspects of quality in employment, identifying risk groups, furthering areas of progress and contributing towards the development of European policies which foster improvement in job quality.

The methodology followed in the sixth survey carried out in 2015, EWCS 2015, (the first survey was conducted in 1991), has been personal face to face interviews (around 44,000) with randomly selected workers based on a statistical sample made up by a representative cross-section of society. The survey was conducted in 35 countries: the 28 Member States, the 5 EU adherence candidates (Albania, the former Yugoslav Republic of Macedonia, Montenegro, Serbia and Turkey), as well as Switzerland and Norway.

In general, EWCS 2015 indicates as main characteristics of job quality in the agri-food sector: greater prevalence of jobs, excessive working hours in micro companies, lesser appreciation of quality of life by workers than the EU28 average, greater exposure to environmental and ergonomic risks, highly informed workers on health and safety issues, and work stress for various employee profiles. Below, there are remarks on the different factors analysed and their relationship with the group of economic sectors of the 35 countries that participate in the survey.

One of the aspects under scrutiny is the **type of contract** in the agri-food sector, bearing in mind the sex of the worker. In this regard, there is a prevalence of indefinite contracts (76% of women workers and 82% of men) as compared to fixed-term contracts. Furthermore, there is a majority of full-time contracts, with only 5% of men and 30% of women having a contract of 34 hours or less. These values are also notable if compared to the European Union average (38% of women and 12% of men).

In regard to the **workday**, in general, agri-food industry workers have an average working week of 39 hours, one hour more than the European average for sectors as a whole. In regard to gender, women work on average lesser hours than men, but they dedicate more time to work as the size of the company grows. Men, on the contrary, have a longer working day in small companies.

The survey also shows that the proportion of persons who would be more satisfied working shorter hours is greater in small companies. Moreover, it is in this type of companies where employees work the greatest number of unsocial hours (weekends, nights, etc.). This leads us to think that the average number of individual working hours in micro companies is greater than in other larger companies of the sector and than the average of all sectors. This fact is also corroborated by the data from the case studies conducted to support this analysis. For example, in the case of Spain, the case study of the biscuit factory (SP-BISCUIT) regarding a very large company shows that the workers, to a high degree, adjust to the working day of 8 hours. On the other hand, for case studies in relation to wineries and oil presses – all small and medium-sized companies (SP-WINERY, SP-WINE_COOP and SP-OIL_MILL) – the workers remark on the intense workload during certain seasons of the year associated to the farming or treatment of the processed product (harvesting, pruning, etc.).

Work-life balance is worse both for men and for women in the agri-food sector if compared to the EU28 average for all sectors. It is only better in the case of men who work in companies of more than 250 employees.

Turnover in the workplace is greater than in the EU28 average (52% against 47%). Furthermore, 32% of the workers conduct their activity under a multitasking system. This is more frequent in small and medium-sized companies, where it is common for workers to acquire various responsibilities, as was also observed in the case studies conducted.

In general, workers of the agri-food sector consider, according to EWCS 2015, that their qualification and **training** is adequate for their job responsibilities. However, the percentage of workers who confirm they have received training is much lower in this sector if compared to the European Union as a whole, becoming more marked with age. Women workers have benefited from less training than men.

In general, **workload** is greater for agri-food sector employees than in other industries. Nevertheless, the survey shows that the profiles at greatest risk of work stress due to intense workload and reduced autonomy are women in SMEs and men in large companies, or those aged fewer than 35 or over 50 in small and medium-sized companies. This work stress can be compensated by a good social atmosphere in the working environment. In this regard, the workers of the sector enjoy a more positive social environment than the European average, except for women workers in SMEs.

With respect to **occupational hazards**, workers show they know the safety norms to a greater degree than the European average. Environmental risks, followed by risks in regard to posture and movement, are the most common in the agri-food sector.

2.3 Main challenges of the agri-food industry

Agriculture and agri-food industry are sectors which are linked intrinsically and sequentially, so that agri-food needs agriculture in order to be able to carry out its activity. Farming provides the raw

materials for the processing of products and, to a large degree, agri-food companies are linked to the land through the farming concerns, and this is especially true in the case of small industries. This is why both sectors face common future challenges.

The main challenge of the agri-food industry will be to ensure the supply of food products in a context of growing population and consumer levels. On a worldwide scale, the United Nations Food and Agriculture Organisation (FAO) has warned that by 2050 it will be very difficult to maintain food supply, with the world population once more at risk of famine. This risk is due to the growth of the planet's population to 9,200 million people, climate change and the increasing scarcity of water (Domingo et al., 2015, Olav and Marchewka, 2017). For 2050, there is an estimated increase in the demand for food of 60%, an increase of 30% in the water required for agriculture in 2030 and a 45% increase in the consumption of energy for this same year.

This is why both agriculture and the agri-food sector must increase their productions by 1,200 million tons, of which 1,000 should be cereals and their by-products. At EU28 level, its 500 million consumers also need a reliable supply of healthy and nutritional food products at an affordable price (FAO).

Together with the challenge of supplying the population with sufficient food products (security), there appears the challenge of doing so with improved healthiness. There is talk, therefore, of the above mentioned concept of healthy and nutritional food products, especially bearing in mind that there are studies published by the World Health Organisation (WHO) which pinpoint food as being behind 40% of the cancers of unknown aetiology and a third of cardiovascular illnesses (Domingo et al., 2015).

Financial access and affordability of food is also a challenge. Not only should there be food in sufficient quantity, it must also be within reach of consumer economies. Eating cheap is one of the requirements which has been strengthened by the economic crisis and which forces us to look for more efficient technologies to achieve this (Domingo et al., 2015).

Lastly, but no less importantly, and something that has been underlined to a large degree by the European Union in recent years, there is an endeavour to ensure that production of these foodstuffs is sustainable (Domingo et al., 2015). The technologies applied have been useful but are requiring the use of large quantities of petrol by-products which, in turn, do not help control the other two accompanying challenges: climate change and the scarcity of water. The implementation of systems for correct environmental management of the entire chain, analysis of the complete product cycle, determination of the best techniques available for the prevention of contamination or maintenance of biodiversity, are other goals which can be demanded from the sector. The target is to supply food in sufficient quantity, that is financially affordable, adequate health-wise, appetising and environmentally friendly. These are challenges to be met to a large degree through innovation. Science and new technologies can allow us to find more sustainable growth and development models for food.

Furthermore, there are many current and future parallel challenges which have an effect on the agri-food industry, such as worldwide competition, economic and financial crises, climate change and the volatility of commodity prices, such as fuel and fertilisers.

2.4 Institutional framework and context

Each of the three cornerstones tackled in this study - innovation, job quality and agri-food industry - has its own regulatory and institutional framework and there is no common outlook, even if the European Union does have a strategy for innovation in agriculture and food sustainability.

In this regard, the Europe 2020 strategy has defined the roadmap to be followed in order to implement innovation in Member States. The Innovation Union was launched in 2010 as flagship initiative of the Europe 2020 strategy for the purposes of strengthening and eliminating the weaknesses in Europe in

regard to innovation in order to achieve a more competitive Europe in view of budgetary limitations, demographic variations and increase in global competition (European Commission, 2015a).

The Innovation Union, during its first years, has managed to promote innovation, integrating it in the main European, national and regional policies and involving all the key actors. Decisive measures have been adopted; however, response has not been equal in all the Member States. The commitments requiring greater national participation have progressed to a lesser extent, partly due to long legislative procedures and because they are less binding by nature (European Commission, 2015a, Makó and Illéssy, 2015).

Five priorities are established within the framework of this initiative: strengthening the knowledge base and reducing fragmentation, getting good ideas to market, maximising social and territorial cohesion, pooling forces to achieve breakthrough: European Innovation Partnerships (EIP) and leveraging our policies externally.

Under the first priority, we should highlight the launching of the Horizon 2020 financial instrument, as the biggest EU Research and Innovation programme ever, with around 80 billion Euros for the 2014-2020 period. This instrument spans different areas of development which includes the agri-food sector. In this regard, the challenge is to meet consumer needs and preferences while minimising the associated impact on health and the environment. Research and innovation will address food and feed security and safety, the competitiveness of the European agri-food industry and the sustainability of food production, processing and consumption.

Furthermore, a Strategic approach to EU agricultural research and innovation has been established which will be implemented between 2018 and2020, thanks to Horizon 2020 funding. The strategy aims to boost demand-driven innovation and the implementation of research, creating synergies between EU policies (European Commission, 2015b).

Meanwhile, the European Innovation Partnership "Agricultural Productivity and Sustainability" has set in motion the interactive innovation model, which aims to increase project impacts through the establishment of a process of genuine co-creation of knowledge (European Commission, 2015b, European Commission, 2014).

Competitiveness of small and medium-sized companies is also being pursued Europe-wide through the COSME programme. This programme endeavours to help access to financing on the part of SMEs, support their internationalisation and access to markets, create a favourable environment for competitiveness and promote an entrepreneurial culture.

At national level, there are great variations with respect to innovation policy. Within the framework of the Quinne project, an analysis has been conducted on innovative policies within the European Union and of the Member States participating in the project (*Makó and Illéssy, 2015*). Generally, the conclusion was that there are two types of countries: those which combine the use of tax instruments (i.e. tax incentives) with direct schemes and programmes, which include France, Hungary and The Netherlands; and those countries which have a variety of schemes and programmes without significant incentives (Germany, Sweden, Spain and United Kingdom).

With regard to agriculture, the Common Agricultural Policy (CAP) has been one of the cornerstones of the Union in recent decades. This policy, created in 1962, represents an *"association between agriculture and society, between Europe and its farmers"* (European Union, 2017). In order to tackle the aforementioned challenges, the CAP has permitted farmers to carry out multiple functions for society, especially that of producing foodstuffs.

Many of these farms have been transformed into companies of the food industry or represent their raw material supply. There now appears here the first concept highlighted in the fieldwork conducted in order to get a better understanding of the link between innovation and job quality in this sector; namely, the difference between agri-food companies associated to the land and farming of one or more agricultural product, as opposed to those industries which acquire their raw materials in the market and which use them to generate a new agri-food product.

The CAP has contributed towards the quality of life and working conditions of farmers, both through direct contribution to the economy and aids to income which pay the farmers as support (direct payments of pillar 1 of the PAC), and market measures to tackle certain situations, focusing on rural development with initiatives such as training, aid for modernisation and innovation in farms, fostering of co-operativism and the promotion of local products, among others. This policy has contributed significantly towards innovation in the sector and the conservation of local quality products, which has also entailed the consolidation and growth of the agri-food industry, often linked to the environment.

As far as job quality is concerned, Makó et al. (2016) point out that this is also a priority in the Horizon 2020 strategy, but no direct relationship with innovation is established.

In regard to the context, in the last 15 years there have been two significant events which have had an effect both on agriculture and on the agri-food industry, which varies according to the Member State. On the one hand, the adhesion to the European Union of various central and eastern European countries; and on the other, the economic crisis which began in 2008, according to Carraresi and Barterle, 2015.

Analysing the first of these events, the extension of the European Union borders opened up possibilities of trade with another 13 countries, thus increasing commercial exchanges and demand (the latest adhesion was Croatia on 1st July, 2013). In turn, as indicated by Bojnec and Fertő (2015) these events intensified competition between the countries and the creation of new opportunities, both for business and for employment and professional careers for European workers.

Secondly, the world economic crisis of 2008, which in the case of Europe had particular effect on the Mediterranean countries, has prompted trends in agriculture and the agri-food business which had never been seen before (Carraresi and Barterle, 2015).

Effects such as the loss of confidence in international markets, difficulty of access to financing with consequent need for international investment, high deficits which have entailed intense austerity measures, etc., have meant a reduction in investment in research, development and innovation, the loss of numerous jobs and the reduction of job quality, the closure of less competitive companies of the sector, etc.

Nevertheless, firms operating in agri-food activities have been less affected by the economic crisis in the later period of years analysed than those in other industries due to the anti-cyclical nature of the food sector. Firms from the most competitive countries were able to identify and fully take advantage of the opportunities existing in the EU market during this period. Thus, a firm's capability to act in international markets is becoming more and more important, just as it is for small businesses to achieve successful results (Carraresi and Barterle, 2015).

2.5 Conducted analysis

As mentioned above, the methodology followed for analysis of the effect of innovation in job quality in the agri-food sector is based on case studies. It is a research method which implies a process of investigation characterised by the systematic and detailed examination of companies; in this case, related with the agri-food industry.

The case studies have been conducted in Spain and Hungary. In the case of Spain, the food industry is the largest industrial sector with over 90 billion Euros of annual turnover. Its relevance is even greater if the agri-food value chain is analysed, which contributes more than 8% of the GNP, and makes up the second backbone of the economy after tourism (Domingo et al., 2015, RegioPlus Consulting, 2016). In Hungary, its relevance is similar, being the second most important sector in terms of number of workers and third most important producer in the manufacturing sector (Kálmán et al. 2016).

Both countries have a strong agri-food tradition, an industry which has grown and developed in close contact with the rural environment, and therefore considered a key sector for the population and for rural development (Domingo et al. 2015, RegioPlus Consulting 2016, Kálmán et al. 2016).

The job quality of the workers of the agri-food industry has changed in both countries in the last years. In Hungary, the attractiveness of the food industry for employees is rather modest due to unfriendly working conditions. However, significant improvements have been achieved since 2004. As a member of the European Union Hungary has adopted and implemented all the common EU regulations, standards of food production and inspection. Several quality assurance systems implemented have positively influenced working conditions (for example: HACCP, ISO 9002), new standards and norms as well as environmental expectations contributed to create a healthier environment and friendly working conditions. Employers have to make sure, for example that the rules of occupational health and safety are respected. Due to the need to document the workflows, the traceability and quality of working conditions were also further improved (Kálmán et al. 2016).

The daily operation of the food industry involves a great numbers and variety of equipments and machineries. The skilled jobs are increasingly important compared to unskilled jobs and require a wide range of high skill knowledge: engineering skills, packaging technology skills and environmental knowledge are increasingly important. The developments often require creativity and intellectual work (in case of product development, marketing) (Kálmán et al. 2016).

In Spain, the financial crisis has had an important impact in this sector, although this has been lower than in other industries. In short, some of the particularities of the job quality of this sector in Spain are: the pay restraint during the period of economic crisis has generally been lower in the food sector compared to other sectors; are more workers covered by a collective agreement in this sector than in the rest of sectors; and employment contracts with a duration of more than 1 year are somewhat more frequent; moreover, average working hours in this sector are higher than in the rest of the economy (RegioPlus Consulting, 2016).

The case studies have been carried out fully by Quinne project partners in the two countries. Specifically, an analysis has been made of four companies in characteristic sub-sectors of Spain (SP-WINERY, SP-WINE_COOP, SP-BISCUIT and SP-OIL_MILL) and three in Hungary (HU-PASTA_COOP, HU-WINE_ASSOC and co-operation project for wineries HU-WINE_EXPORT):

- **SP-WINERY**: It is a winery located in the northwest of Spain which produces wines of good quality regulated by Denomination of Origin (D.O.) labels. The company arise as a private initiative and it is part of a 3 winery group. It is an innovation leader in his region as they have invested a great deal of effort and time in developing different research, development and innovation projects as a source of knowledge of their product. The winery in question has 28 permanent staff and the same number working intermittently, which when calculated as full-time equivalents, would stand at 40 workers. (RegioPlus Consulting, 2017a).
- **SP-WINE_COOP**: The companys organisational model is one of an agri-food cooperative (wine) made up more than 50 members. The organisational structure is characterised by a high level of participation, with integration of the members in organisational management. It is based on a

Governing Board, selected by the members, that is directly responsible for the Wine Cellar employees, which currently consist of 5 workers. (RegioPlus Consulting, 2017b).

- **SP-BISCUIT**: This is a family business which was the pioneer in the manufacture of biscuits and bakery and cake products. Its constant efforts at innovation and its strategy oriented towards R&D make it a leader in the healthy biscuit segment. The company has three production plants, housing the modern biscuit manufacturing technology. Currently, the company has more than 1000 employees. Over recent years, it has seen a major rise in its workforce, from around 250 employees in 2002 to more than 1000 in 2017. Since this is a big company, it is the only Spanish case study which has and R&D&i and Human resources departments and trade union representation (RegioPlus Consulting, 2017c).
- **SP-OIL_MILL**: The company is a family run business made up of the parents and three children, which has carried out different projects linked to the food industry and in this particular case, to tourism. The organisational unit selected for analysis is the fourth of the family business group created by the family, and consists of an olive farm and associated mill, which has been recognised under the Designation of Origin system for Olive Oil of the region where it is located. The olive farm has 4 employees (RegioPlus Consulting, 2017d).
- **HU-PASTA_COOP:** The main activity of the company is pasta manufacturing. The company group, involved in pasta manufacturing and producing flour and egg as well as seeds is entirely in Hungarian ownership and controls all the processes ranging from raw material production to selling the finished products. A cooperative organisational culture and the related micro-corporatism were created by the prospect of long-term promotion opportunities and the strong social ties between the company and the local community. Because of conscious development strategy during the past 45 years, the efficiency of production has been increased through the use of the most modern technology and now the production is entirely automated. At present, there are 132 different jobs at the Group and several hundred workers (Kálmán et al. 2017).
- **HU-WINE_ASSOC**: It is a small family winery. The organisational-managerial (marketing) innovation of the company is connecting wine consumption to gastronomy services. They are part of an association of innovation, the "Wine Road". It is a tourism product in the form of a thematic journey into a wine region. It is based on local initiatives and cooperation (Gubányi et al., 2017b).
- **HU-WINE_EXPORT**: This case study focuses on a Hungarian winery looking for ways to survive in a competitive market as well as the winemakers' cooperative organised and managed by it. The winery is a family enterprise with nine employees; four of them are semi-skilled. They participate in the Kadarka Roundtable. This is a bottom-up initiative launched in 2013 in which professional members have a shared agenda to cooperate in developing a common premium category of kadarka bottled wine primarily marketed for export (Gubányi et al., 2017a).

The methodology followed pursuant to an in-depth analysis of these cases includes two main actions: (1) in-depth research work on the industry to be analysed and of the sub-sector in which it conducts its activity, and (2) a series of interviews with employees and managers both of the company and of organisations/entities which are key to the development of the business. During these interviews, there has been an attempt to identify in detail the degree of business innovation, analysing the different transformations implemented by the company in recent years, as well as job quality and the mutual relationship between them. In this regard, there has been detailed analysis of the different factors considered to be key dimensions of job quality according to the definition used in the QuInnE project (see Warhurst et al. 2016). These factors include salary, working hours, personal satisfaction, professional career perspectives, work-life balance, occupational safety, presence of unions, etc.

Table 2 summarizes the case studies analysed, the type and size of company studied as well as the number of interviews conducted in each case.

Table 2: Case studies in the agri-food sector

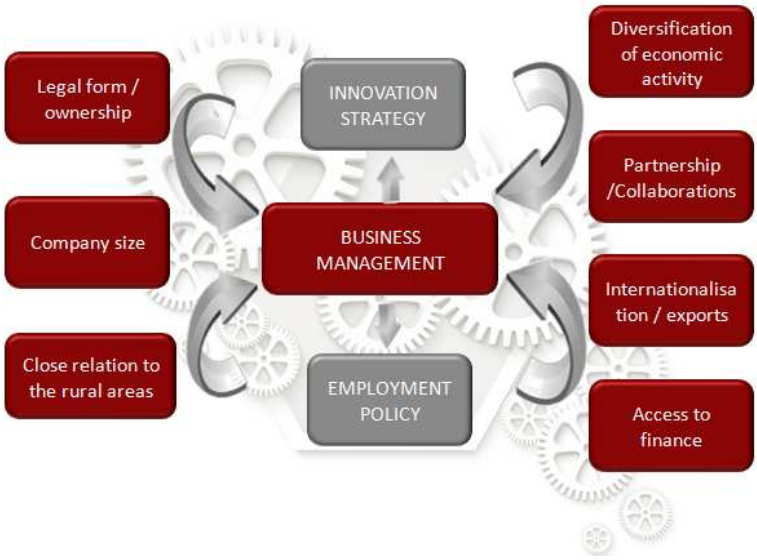
Pseudonym	type of company	number of employees (< = 50; 51-500; 501-2500; > 2500);	number of interviews
SP-WINERY	Independent company	< 50	6
SP-WINE_COOP	Independent co-operative	< 50	7
SP-BISCUIT	Independent family ownedy company	501-2500	9
SP-OIL_MILL	Subsidiary of a large agri-food holding (family owned)	< 50	7
HU-PASTA_COOP	Independent co-operative	51-500	16
HU-WINE_ASSOC	Family business/Association	< 50	5
HU-WINE_EXPORT	Family business/ Round table	< 50	9

Source: Own compilation based on case study reports (see list of reports in section 6 of this chapter)

Another important factor is that the agri-food industry has a **wide variety of sub-products**: meat, dairy, processed fruit and vegetable products, wine, etc. This implies that the global analysis of the sector is complex given the number of sub-sectors it spans. The case studies conducted have focused on characteristic sectors or pioneering companies in each of the countries under scrutiny: wineries, oil presses, leading-edge biscuit and pasta factories which are leaders in the sector.

A detailed analysis of the case studies has revealed a series of common points which are considered influential factors both in company management and in the innovation processes implemented in the agri-food industries and in job quality, as shown in Section 4. Below is a brief analysis of these factors.

Figure 4: Common factors identified affecting business management



Source: Own elaboration

2.5.1 Influence of the context and legal form of companies

Previous empirical research has highlighted that the type of organisation or company is a critical factor when it comes to fostering or downshifting participation of workers in their own improvement of the working environment (Toner 2011). In the agri-food industry, the context and market orientation has had a special impact on the types of business organisations which exist today.

As from the decade of the nineties, there has been a rapid process of agri-industrialisation in Europe, characterised by the incorporation of private companies (Henson and Cranfield, 2013). In general, we can mention three large sets of changes (Henson and Cranfield, 2013, Reardon 2007): an increase in food processing, distribution and supply of agricultural consumer goods outside the farm, institutional or organisational changes in the relationship between agri-industrial companies and primary producers, and the changes in the primary production sector in terms of product composition, technology, sector-wide structures and market.

Events such as the liberalisation of trade and bilateral trade agreements have prompted the opening of markets to the agri-food industries. . Furthermore, in recent decades, the investment in technology in the industry has multiplied as the experts confirm. This was associated to the progress from technological transformation in the 20th century to the era of digital transformation (Berger and Frey, 2016).

In this industrial context, together with the political changes that have come about in recent years, especially for those countries which have been the last to adhere to the European Union in order to create EU28, changes have occurred regarding the ownership of the companies. In this regard, as indicated by Kálmán et al. (2016) there is a marked **process of privatisation** of agri-food industries which began at the beginning of the nineties and which had particular effect in eastern European countries. The aim of privatisation, in the case of Hungary, was to increase the competitiveness of companies and strengthen its integration in an international market, also favouring the incorporation of innovation and modifying the labour conditions of workers.

A good example is the case study of the pasta factory (HU-PASTA_COOP). During the period of privatisation, the management decided on changing the company form. As a result, the group of companies was established in 1990. The assets of the new company were shared nearly evenly between the employees and managers with a nominal value of one billion forint and other assets of the same volume. The members of the cooperative were given stocks during the course of privatisation. Asset concentration, changes in regulations, corporate acquisitions and a transparent organisational structure led to the formation of a larger company group (Kálmán et al., 2017).

This opening to the global market signified the input of **foreign investment and ownership** in the agri-food industry. In the case of Hungary, of note is the current existence of around 200 agri-food producing companies in the country, of which two-thirds belong to foreign investors (Kálmán et al, 2016).

Another of the characteristic factors has been the fragmentation of the sector. It reduces competitiveness of the companies. Traditionally, the most common way of preventing fragmentation was to create **co-operatives**, company organisations that bring together partners that agree on objectives and that normally take charge of storing, transforming and marketing in this sector. In fact, in the Spanish scenario, the marketing of farm products via co-operatives acquires a volume near the average in the European Union, with a percentage of between 40% and 50% of turnover.

This formula offers certain advantages to small producers as much as it boosts an increase in their bargaining powers (both in collective bargaining with sellers of agricultural inputs and with purchasers of the prepared outputs) and the generation of economies of scale and of scope that they would not

have access to on an individual basis (reduction of transaction costs and quality control in the supply chain, access to innovation and technologies, etc.).

The co-operative is, in a certain way, an innovation in itself within the framework of the different types of company (SP-WINE_COOP, HU-PASTA_COOP). It is a case of corporate economy and innovation, where the interests of the members prevail. In SP-WINE_COOP the organisational structure is characterised by a high level of participation through the Governing Board, selected by all the members (RegioPlus Consulting, 2017b).

In the pasta factory (HU-PASTA_COOP) the cooperative organisational culture and the related micro-corporatism were created through employees' participation in company ownership and through the prospect of long-term promotion opportunities and the strong social ties between the company and the local community (Kálmán et al., 2017). In addition, the owner status of employees of the company group has strong impact on the everyday life of the company. When the former agricultural cooperative was transformed, all employees were given shares in relation to their number of shares held in the former cooperative. Later some employees sold their shares for financial consideration while others retained them. This is how the current ownership structure has been formed in the end. All managers are owners so they do not only push the interests of their own division forward but they also worked for the success of the entire company.

According to the interviewees' experiences, the owner-employees agree with and support the directions of development. In their view developments are favourable; they understand their necessity and practically they are proud of working for such a socially responsible workplace.

> *„We can take part in such developments that do not necessary take place at other companies." (Electrician, HU-PASTA_COOP).*

According to Morales (2006), co-operatives present three main aspects on which to build advantage and competitiveness: human capital, structural capital (both support and favour the co-operative principle of education, training and information, which is the soul of co-operativism) and relational capital (capacity of networking between co-operatives which allows them to meet more objectives jointly than individually). Also Sissons et al. (2017) corroborate that co-operatives are a legal entity which are a source of empowering and quality in employment.

At the same time, the agri-food industry has been traditionally linked to the territory and to farming. Considering the private and family ownership of the land, a high percentage of agri-food industries are **family owned businesses**. The majority of the case studies analysed correspond to this type of company (SP-BISCUIT, SP-OIL_MILL, HU-WINE_ASSOC and HU-WINE_EXPORT). In the case of Spain, for example, 82% of manufacturing companies are family owned (Instituto de la Empresa Familiar, 2015).

From the case studies analysed, there emerges the importance of company ownership in its management strategy, which has a direct influence on the innovation and job quality policies. The different forms of management, communication, interrelation with workers, corporate roadmaps and business lines, etc., are factors which are directly linked to the ownership structure.

Of note is the case of the Hungarian pasta manufacturing company (HU-PASTA_COOP) founded in 1953 and converted into a farming co-operative before the collapse of the socialist political-economic regime. Later on, during the privatisation process in 1990, all the shares were distributed among the employees, becoming an example of micro-corporativism. This company structure has been key to the participation of employees in all the corporate policies of the company, as well as being an innovative strategy that was pioneer in the sector and in the country (Kálmán et al., 2017).

2.5.2 Company size

The agri-food sector is characterised by its **fragmentation**; as seen before, almost half of the turnover of the sector is generated by small and medium-sized companies. In the case of Hungary, for example, two thirds of the companies of the sector are micro companies, with less than 10 workers (Kálmán et al, 2016). The case in Spain is similar, with 79 % of micro companies of the total of 23,083 companies in the sector (RegioPlus Consulting, 2016). Accordingly, most of our case study companies are small companies too (SP-WINERY, SP-WINE_COOP, SP-OIL_MILL, HU-WINE_ASSOC and HU-WINE_EXPORT). This means that those companies do neither have defined R&D&i and human resources departments, or an internal trade union structure.

In general, the small size of companies is a limiting factor for corporate competitiveness when it comes to internationalisation, innovation and increased productivity processes. For that reason, some of these companies need the cooperation to implement innovation projects (see 2.5.4).

In the case of the food industry, the differences between sub-sectors involve a great diversity in terms of turnover and employment figures. Dissemination of technological information and know-how is necessary among SMEs, due to their limited capacity for investment and innovation (Toner 2011).

2.5.3 Relationship with the local environment

As mentioned earlier, the agri-food industry has always been closely tied to farming as it is the origin of the raw material whose will be transformed in the food industry. Its relationship with the local environment is direct and dependent. That is why a high percentage of the agri-food companies are located in rural areas, contributing towards economic development and the creation of employment in these areas (all of the case studies).

In this regard, the case studies conducted have shown that in innovative processes which generate employment, the agri-food companies give priority to **hiring local workers**, provided that they have the required qualification. The relation of the industries with the environment, therefore, distinguishes them from companies with a greater urban presence, showing a certain social bond between the agri-food industry and the local environment.

In addition, two types of agri-food companies have been shown to exist when it comes to **dependence on crop** or raw material and how they relate to job quality. Firstly, there are companies which acquire from the local or non-local farmer the required raw material(s) to obtain the final product, as in the case study analysed of the biscuit family (SP-BISCUIT), where the required ingredients are acquired and then transformed through a processing chain. In this type of company, normally of larger size, the workers have clearly defined responsibilities and working shifts and the organisation is not affected by seasonal issues.

Secondly, an important part of sub-sectors (vineyards, livestock, olive groves, etc.), develop two activities: the transformation of the products and the farming, as in the case of the wineries under scrutiny which have their own vineyard (SP-WINERY, SP-WINE_COOP, HU-WINE_ASSOC and HU-WINE_EXPORT). In this case, the companies tend to be of a smaller size and the characteristics of the crop/livestock require from the worker a certain degree of availability or variation in working hours. For example, the seasonal nature of the vineyard affects winery workers as much as they are affected by workload peaks associated to the grape harvest and vine pruning. In all the case studies, there is evidence that workers accept such increases in workload in their stride and as something inherent to their job responsibilities.

2.5.4 Importance of co-operation

Co-operation, associations and partnership, transfer of know-how, etc., are an essential element for the introduction of innovation in the agri-food industry. The above-mentioned fragmentation of the sector entails the need to network in order to develop know-how and thus survive in a global market and in a competitive scenario.

Given the lack of research, development and innovation departments in the small companies which prevail in the sector, **of note is the co-operation with research centres and universities** to generate innovation and opportunities, and to maintain employment (SP-WINERY, HU-PASTA_COOP, HU-WINE_ASSOC and HU-WINE_EXPORT). In the case study of the Spanish winery, the majority of the research projects of the winery are implemented in cooperation and collaboration with different departments (viticulture, microbiology, etc.) of the CSIC (Advanced Scientific Research Council, part of the Ministry of the Economy, Industry and Competitiveness). They are joined by a close relationship which has now reached the level of friendship, and thanks to which both communication and ideas flow freely (RegioPlus Consulting, 2017a).

In the HU-WINE_ASSOC case study, a tourism product in the form of a thematic journey into a wine region has been analysed. It is based on local initiatives and cooperation, and works as an association (Gubányi et al., 2017b).

> *„We have to stress that a new thing in this region was that enterprises cooperated this way. Basically, oenologists like preparing their wines on their own but, at the same time, the power of cooperation should not be disregarded, either as this can take the individually producing oenologists into a different dimension." (Professor, external expert, HU-WINE_ASSOC).*

On the other hand, as upheld by Carraresi and Barterle (2015), participation in national or international projects financed with public funding are also a source of innovative initiatives.

2.5.5 Need to export

An analysis of the agri-food industry shows how exports of agri-food products in Europe have grown each year in the last decade. In a liberal and open market, with trade agreements with many countries or regions of the world, internationalisation of companies and exports have emerged as a way to maintain the business and a necessity as an alternative to the sale of products in locally saturated markets. The European Union is **world leader in agri-food exports**; making up 7% of EU exported goods (European Commission 2016).

The study conducted by Carraresi and Barterle (2015) seems to indicate that there exists a clear interrelation between competitiveness and specialisation in export or export-orientation of the country.

All the companies analysed in the case studies export part of their production, mainly within the common market, and in some cases also internationally to America and Asia. In the company SP-WINERY, the commercial department of the winery is made up of one manager and 7 other persons, 3 of whom are dedicated to export, 3 to the domestic market and one person who works on backup and is the logistics manager of the group (RegioPlus Consulting, 2017a).

The recent investments at the pasta factory (HU-PASTA_COOP) have resulted in a significant capacity increase. Efficient exploitation would not have been possible without increasing the volume of export. Domestically, increasing brand turnover has a limited potential, which is why in the past few years the company has turned to manufacturing brands for trade export. In addition to developing

manufacturing, their logistic activities are also being significantly improved. As a result, their products can be sold at very competitive prices to even longer distances (Kálmán et al., 2017).

The implemented innovation has helped companies to reach the level of competitiveness required to participate in international markets. In turn, maintaining this competitiveness requires a strategy which ensures the export of their products. This fact has prompted the creation of new profiles and the need for new skills in workers, such as those related with languages in view of internationalisation and export, or with technology depending on the innovation implemented.

Investments made in marketing and communication activities (market research, consumer surveys, trade fairs, etc.) help reduce the risk of failure and develop essential skills needed to succeed in exporting (Carraresi and Barterle, 2015).

2.5.6 Business diversification

In recent decades, farming activity has seen a drop in its cost-effectiveness, partly caused by the liberalisation of markets and partly due to the increase in the cost of commodities. This, together with other factors, has caused the reduction in employment in the sector. This is why both farmers and companies of the sector have seen the need to create new business lines for their activities. Without a doubt, one of the ways of diversifying the business has been the transformation of farming products, making the agri-food industry a very strong sector within the European Union.

On the other hand, creation of synergies with other economic activities has been fostered which, as a whole, improve the viability and sustainability of the businesses. In this regard, the **tourism** sector has been the foremost creator of synergies (ASAJA, 2011). Observing the case studies conducted, we can conclude that tourism represents a complement to the business in those agri-food industries linked to a crop or livestock farm; that is, associated to the land. That is the case of Spanish and Hungarian wineries (SP-WINERY, SP-WINE_COOP, HU-WINE_ASSOC) which often offer guided visits to vineyards and installations, together with wine-tasting. Similarly, in some cases, this wine tourism is linked to gastronomic tourism, where local products can be tasted. In the case of HU-WINE_ASSOC, the application of the new business model was made easier by the culture of the local wine tourism (Gubányi et al., 2017b).

This type of product and sector innovations entails the creation of new profiles and organisational changes in the distribution of responsibilities among the workers.

2.5.7 Access to financing

Another of the factors identified in the case studies, which are common to certain kinds of agri-food industries, and which have a direct impact on innovation and job quality, is **access to financing.**

Due to the fragmentation of the sector and the large percentage of small and medium-sized companies in the agri-food industry, most of them do not have a specific amount budgeted for research, development and innovation (SP-WINERY, SP-WINE_COOP, SP-OIL_MILL, HU-WINE_ASSOC and HU-WINE_EXPORT). Hence, in addition to fostering networking to provide incentive for innovation, this type of company needs aid and public financing for development. This is considered a limitation to innovation and, therefore, to its relationship with quality in employment, and companies of the sector are therefore financially dependent on public support.

The case is different for large companies (SP-BISCUIT and HU-PASTA_COOP) where, even though in some cases they are beneficiaries of public aid, most of them have an annual budget for investment in innovation, as well as their own R&D&i department.

3 Innovation and job quality

As pointed out by Heijs and Buesa (2016), theoretical and empirical literature published to date does not identify an accepted model with respect to the effects of innovation on job quality or vice-versa. In the same way, no definitive bibliography has been found which spans the three areas studied in this article: job quality, innovation and agri-food industry in the European Union. In this same study, two schools of theory are identified which provide their view on the impact of innovation on employment at a macro-economic scale: a neoclassic trend based on compensation mechanisms which ensure the recovery of lost employment due to innovation and a more evolutionist view which recognises the problems in the labour market generated by the technological process. The first school presumes that workers are universal and can be employed in any sector or for any kind of job and that; therefore, innovation in new products has a positive effect on employment, while innovation in progress will have an effect which depends on each situation. According to the second school of theory, there exists "technological" unemployment associated to the imbalance between the training of the workers expelled from traditional sectors and the human capital requirements in emerging innovative sectors.

In terms of job quality, empirical studies have shown that, in the eighties and nineties, structural changes have destroyed low skilled employment in traditional sectors while there has been an increase in skilled jobs in the medium and high technology sectors (Heijs and Buesa, 2016). It is known that certain organisational, technological or product changes or innovations have a direct effect on the labour conditions of workers. In this regard, Muñoz de Bustillo et al. (2016) point out that technological and organisational changes in companies in general produce an increase in productivity, which translates in salary increases and reduction in working hours and improvement in working conditions. Heijs and Buesa (2016) conclude that 62% of the empirical studies analysed in their report show an improvement in worker skills as indicator of quality, and in 60% an improvement in terms of salary.

Furthermore, literature shows a positive interrelationship at member state level between job quality and innovation, with a greater repercussion in the intrinsic quality of work, and lower for health and safety and work-life balance (Muñoz de Bustillo et al., 2016).

The following sections will analyse more in detail the motives and reasons behind the incorporation of innovation in the agri-food sector, the type of innovations with the greatest effect on the sector and their interrelation with job quality. It is based on the 7 case studies conducted in Hungary and Spain and supported, to the greatest degree possible, by existing literature.

3.1 Innovation motivations and types

The introduction mentions the affirmation of Berger and Frey (2016) regarding the technological stagnancy which has characterised the agricultural sector for years, even though in recent years progress has been considerable.

Domingo et al. (2015) indicate that there are at least three vectors which have an effect on accelerating innovation in the agri-food sector: growing knowledge of the relationship between food and health, the expansion of genomics and emerging technologies in other sectors, but which are applicable to the agri-food industry. The latest surveys conducted in 2016 by FoodDrink Europe indicate that the trends which motivate innovation are the introduction of different products and the generation of new sensations, such as sophistication and easier handling (FoodDrinkEurope. 2016).

It has already been stressed in this analysis that one of the most efficient corporate tools for generating competitiveness and solving both internal (sustainability) and external (austerity, for example) issues is innovation. Jaruzelski et al (2017) affirm that the rate of introduction of innovation has increased

considerably in the last 10-15 years, with important advances in genomics, software, communications, logistics and technology.

According to the Oslo Manual, 2005, (OECD, 2005), there are four main types of innovation:

- Innovation in product/service: Introduction into the market of new (or significantly upgraded) products and services. It includes significant variations in technical specifications, in components, in materials, in the incorporation of software or in other functional features.
- Innovation in processes: Implementation of new (or significantly upgraded) manufacturing, logistics or distribution processes.
- Organisation innovation: Implementation of new organisational methods in the business (knowledge management, training, assessment and development of human resources, value chain management, business re-engineering, quality system management, etc.), in work organisation and/or in relations abroad.
- Marketing innovation: Implementation of new marketing methods, including significant upgrades in the purely aesthetic design of a product or packaging, price, distribution and promotion.

It is frequent to observe interrelations between the different types of innovation. For example, how product or process innovations entail changes in marketing strategy. An example is the innovations of procedures implemented in the Spanish winery SP-WINERY. The innovations related to a more sustainable and environmental friendly crop-growing techniques turns out to be of great interest for commercialising the product in countries of northern Europe where this kind of biosustainable activity, circular economy and utilisation are appreciated (RegioPlus Consulting, 2017a).

In the pasta factory (HU-PASTA_COOP), the economic success of the company is based on the following three drivers: technological, organisational and social innovations. According to the interviews, joint-participation of employees and management (using Employee Stock Ownership Plan (ESOP) and Management Buy-Out (MBO) schemes) was the key social innovation, which offered not only the urgently needed financial resources in the early 1990's for the technological and organisational renewal, but also resulted in the cooperative culture based micro-corporatism. (Kálmán et al., 2017).

The case study of the Hungarian Kadarka wines (HU-WINE_EXPORT) shows how an organisational innovation of the oenologist involves new innovations and changes in the quality of jobs. The change from socialism in the period before the regime change entailed the loss of knowledge in a generation of oenologists in Hungary and other winegrowing regions in Central and Eastern Europe by taking away the transmission of production processes that have been passed down from generation to generation in Western Europe. In the case of wines associated with the Kadarka grape, the trade itself had to be rebuilt from scratch by setting up standards of quality that all wines termed as kadarka have to meet. As a result of the Kadarka roundtable and networking and sharing of knowledge that this effort has achieved, the participants will be more receptive to further innovations and their application in the future, which can have direct positive impacts on employment and job quality (Gubányi et al., 2017a).

In general, we find that in large companies there exists a defined innovation strategy, a regularly updated roadmap which establishes the lines of work to be followed (SP-BISCUIT and HU-PASTA_COOP). However, in small and medium-sized companies, which are more characteristic of the sector, usually specific innovative projects are implemented, which depend to a great extent on the financing available (SP-WINERY, SP-WINE_COOP, SP-OIL_MILL, HU-WINE_ASSOC and HU-WINE_EXPORT).

Traditionally, the public sector has been the economic engine of R&D&i expenses, covering 55% of the costs in 2011. As the case studies show, financing opportunities have a great influence on adapting innovative practices (HU-WINE_ASSOC, Gubányi et al., 2017b).

The financing of the research projects in the Spanish winery (SP-WINERY) is largely obtained from the winery's own resources, as well as from the numerous calls for grants for research and innovation which are applied for. The technical director of the winery emphasises that public support for investment in research and innovation are fundamental to being able to carry out these projects:

> *"Over recent years we have been receiving various grants from the CDTi (the Technological and Industrial Development Centre of the Ministry of the Economy, Industry and Competitiveness). We look above all for non-repayable grants. Without this kind of assistance it would be complicated because the cost is very high. These grants represent between 30 and 50% of the financing of the projects. They are regional, national or European grants." (Head of administrative department, SP-WINERY).*

Nevertheless, due to the slowdown in the world economy, and the mentioned context of economic crisis and austerity measures, this investment in research and development has dwindled. All this has meant that private investment has acquired ever increasing importance, also visible in the agri-food industry (Jaruzelski et al. 2017).

According to Henson and Cranfield (2013), technological advances can be observed in general (particularly information and communication technologies) and, in the agri-food industry, in primary production (for example, the application of biotechnology) and the manufacturing sectors (for example, new processing methods). These technological advances have contributed towards the creation of unprecedented new opportunities for agri-food companies, in terms of innovation of products and processes, vertical and horizontal links in the supply chain, distribution systems, etc. Nevertheless, they also increase the fear that agri-food companies could fall behind if they are not able to access these technologies in a fitting and cost-effective manner.

In the case studies we have analysed innovations in practically all spheres, primarily the following:

- **Market demand**. Demand directly affects the product to be marketed and consequently the marketing strategy. Modified and new packaging models, quality brands, healthier and environmentally friendlier products, fresh cut products, etc., are some examples of adapting to market requirements which have arisen in recent years in the agri-food industry. These have entailed the incorporation of product innovations, technological innovations and, in some cases, organisational innovations.
- A clear example of observed market demand is the case of the biscuit factory (SP-BISCUIT). In this case, the company had to adapt to new market requirements of healthier biscuits, allowing the company also to put an end to the seasonality of the product, associated to the autumn-winter season. This new line of business and product meant, in addition to the incorporation of the required technology to be able to develop the market, the reorganisation of employees to adapt to the new line of work (RegioPlus Consulting, 2017a).
- **Product knowledge and quality improvement.** Understanding the factors that affect the quality of the final agri-food product is essential in a free competition market; that is why another objective detected that is applicable to innovative projects is research and development in new techniques to improve the product.
- As mentioned earlier, fieldwork showed that there are two types of agri-food industries, depending on whether they are linked or not to a crop or livestock farm. In the case of the former, it has been observed that a large part of the innovative strategy of the company is focused on better knowledge of the crop, in order to achieve a higher quality product (SP-WINERY, SP-WINE_COOP, SP-OIL_MILL, HU-WINE_ASSOC and HU-WINE_EXPORT). In this regard, it has been observed how different technologies are used in the case of wineries (computer applications, sensors, drones, new applications, etc.) which permit more detailed knowledge of the vine, of

conditions which affect grape quality (climate, soil, irrigation, etc.), of farming techniques, etc. Therefore it is a case of innovations to improve both products and processing. To a large degree, in-depth knowledge of a product results in a more sustainable crop and a reduction in costs in certain cases.

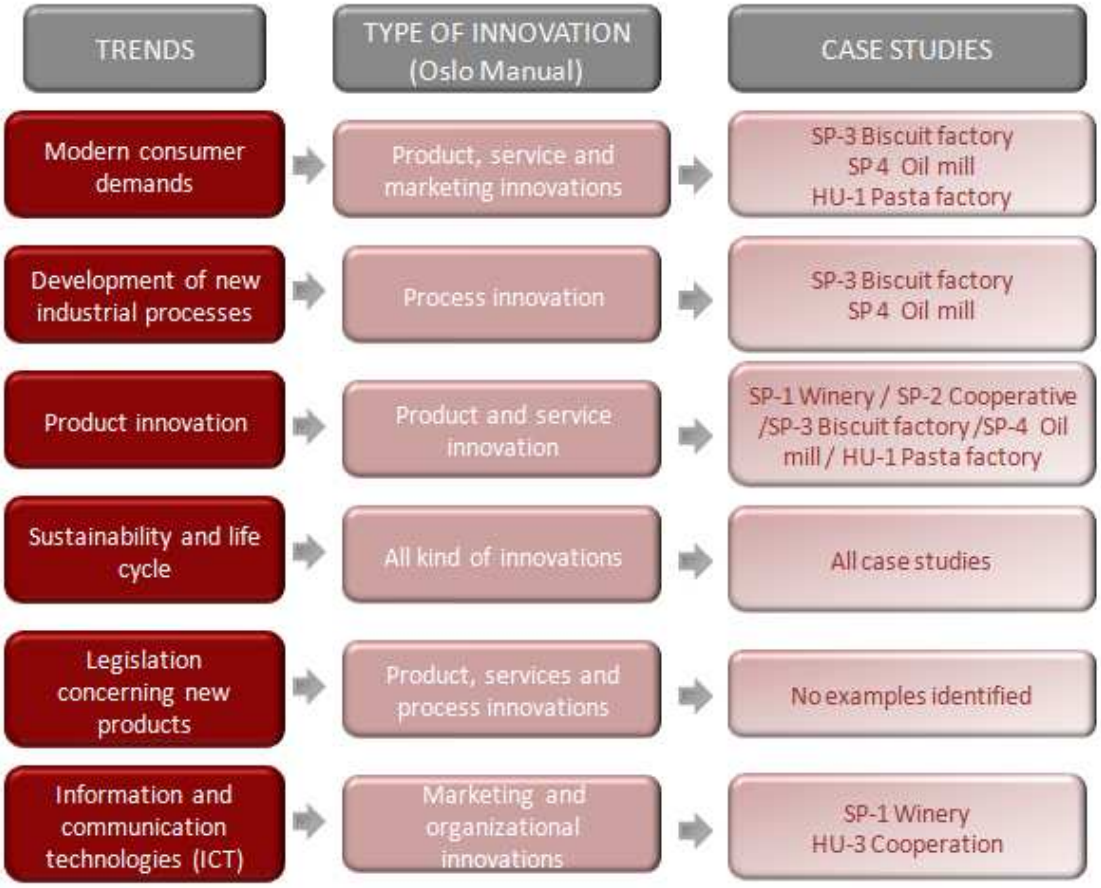
- **Change of context**. Changes of context force companies to adapt to new situations generally in a short period of time. The economic crisis which affected Europe as from 2008 and the consequent austerity measures implemented in the Member States, especially those located in the Mediterranean region, forced companies not only to increase competitiveness but also to pursue sustainability. Innovation and internationalisation became corporate strategies.
- The Hungarian pasta company (HU-PASTA_COOP), for example, managed to adapt to the collapse of the socialist political-economic regime and to corporate privatisation in 1990, by innovating the organisation structure and implementing micro-corporativism (Kálmán et al., 2017).
- **Reduction of costs and effectiveness**. In connection with the changes in context, sustainability has become another corporate guideline. The effectiveness of product processing has been achieved both through delving into knowledge of the crop in some cases, and mechanising the processes by means of incorporation of technology.
- Generally, in all the case studies analysed, the effectiveness of product processing has been both a goal and a consequence of innovation. For example, in the oil press (SP-OIL_MILL), the acquisition of spearhead technology helped them to respond more effectively to pests in the crop and obtain a better quality of oil thanks the availability of devices which allow them to recognise the right moment to harvest the olives, etc. (RegioPlus Consulting, 2017d).
- **Organisational improvements**. The agri-food sector is not characterised by organisational priority when it comes to design innovation strategies, rather the organisational improvements are usually the consequence of product or process innovations. Nevertheless, as mentioned before, the case study of the pasta industry (HU-PASTA_COOP) allows us to see how organisational innovation can be at the origin of all corporate strategy on innovation which could not have been implemented without the participation and efforts of all the members (micro-corporativism). Also the case study HU-WINE_EXPORT analyse an organisational change of the oenologists which involve the renewal of the marketing strategy of the local wine.

Generally, and after observation both of the fieldwork conducted and the literature review, the innovative agri-food companies in Spain carry out an active technological strategy in order to increase their product range, maintain market share and open new markets (including internationalisation), improve production flexibility, reduce costs and increase viability, improve working conditions and reduce environmental impact (Revista alimentaria, 2008).

With regard to improvements in job quality, this does not appear as a fundamental motive for innovation in the agri-food sector. However, as pointed out by Muñoz de Bustillo et al. (2016), even if the motivation behind the innovation process varies and does not have improvement in job quality as main focus, there do exist transfer mechanisms in innovation which link it to job quality. However, these are also related to or influenced by other factors which should be borne in mind, both internal (ownership and legal structure of the company) and external (for example, the market itself), as we will show in our analysis further below.

In addition, Del Pino (2001) includes six trends in the perspectives of innovation progress in the agri-food industry. Within this context, it forecasts the development of different technological processes which will have consequences in different spheres (industry, quality of life, employment, etc.). Figure 5 shows the relationship between these trends, the type of innovation (based on the categories established in the Oslo Manual) and the innovations identified in the case studies.

Figure 4: Innovation trends in the agri-food sector



Source: Own elaboration

3.2 The importance of governance

As remarked earlier during this analysis, the agri-food sector is fragmented, with a large proportion of small and medium-sized companies which generate the greatest amount of employment. In general, in these SMEs, the relationship between those responsible in the company (managers) and employees is usually more direct and the use shorter channels of communication.

In the case studies analysed, it has been observed that the ideas for innovation and improvement arise both bottom-to-top and top-to-bottom in this sector. That is, the role of the worker is important both for proposing the innovation and for obtaining the necessary feedback regarding the positive or negative effect of the technology or change. In this regard, in the more competitive small companies, even if there is a tendency for innovation and predefined lines of strategy, **the direct and close communication between the workers and their managers is essential** in order to implement improvements in the daily running of the industries and serves as a point of departure for innovation.

In the cooperative of wine (SP-WINE_COOP) the top down initiatives (from the managers) have allowed the greatest innovation in recent years, associated with the modernisation of the wine cellar. The modernisation process involved changes not only to the functions of the wine cellar workers, but also to the way of work of the cooperative members, in as much as mechanisms were established to receive the grapes more quickly, flexibly and in better conditions.

The bottom up dynamic (from the cooperative members) is usually proposed as a result of needs observed by the workers themselves (at technical and systems level). They propose innovative

formulas to overcome problems observed when carrying out their work. The Governing Board then decides on whether to implement the innovation (RegioPlus consulting, 2017b).

> *„The company workers are the ones that are most up to date with innovations in the sector. Ultimately, cooperative members are farmers who specialize more in agriculture. However, the final decisions on implementing innovations rest with the Governing Board selected from the members of the Cooperative." (oenologist, SP-WINE_COOP).*

In large companies, communication flow is more structured (SP-BISCUIT and HU-PASTA_COOP). They have innovation strategies which are usually defined between the heads of various departments (R&D&i, marketing, sales, CEO, human resources, etc.) and with an R&D&i department which centralises the implementation of the strategy. In the case SP-BISCUIT the drive for innovation is underpinned at the company by the existence of an R&D department made up of 7 persons, who participate transversally in all the company's meetings (RegioPlus consulting, 2017c).

Even if communication with the employee is not so direct, there exist articulated transfer mechanisms for ideas so that the workers can provide their view of the experience. A good example of these mechanisms is the *"idea box"* which exists in the case study analysed of the Hungarian pasta company (HU-PASTA_COOP), where employees can suggest improvements in the efficiency of the company's processes. If employees have an idea on how to improve efficiency in their own or in other related activities, they may put their proposal into the box located in the centre of the shop floor. The rationale behind making suggestions for the neighbouring workplaces is the following: an outsider may recognise efficiency enhancing solutions better than the others who work there on a regular basis. The submitted proposals are evaluated by the management of the given area and if they find it feasible the creators are given monetary awards. In practice, this means ideas written on a form--such as "What is the idea/problem?" "What would you suggest?"--are collected in the box in the shop floor. The new ideas that are implemented are rewarded by paying the contributors, an amount added to their salary at the end of the month (Kálmán et al., 2017).

It also shows that the different corporate management models influence directly the predisposition for innovation. In this regard, as mentioned earlier, in small companies where there is a company head or manager or technician who fosters direct communication with the workers, the implementation of innovation is less costly as far as adjustment of workers is concerned, as the group of workers is directly involved. On the other hand, in large companies, an open, communicative and transparent management which also fosters participative processes such as the example of Hungarian micro-corporativism, have a positive effect on innovation options and the improvement of job quality. A good example for that is the abovementioned idea box implemented at the Hungarian Pasta factory. Previously, the management collected ideas for small scale, incremental process innovation from the maintenance worksheets. With these simple idea boxes it is much simpler. Moreover, the employees feel that they have their voice, that their remarks are important for the management. It is also worth noting that if a submitted idea proves to be useful, the employee receives financial reward. Last but not least, the idea box is a good tool for the employees to improve professional fulfilment at their job and this does not limit to one specific area. This way the idea box contributes to the inclusivity of the workplace.

> *"Sometimes an outsider looks at things differently and simpler. Through the idea boxes, I can share my opinion not only in my own professional field." (Repairmen, HU-PASTA_COOP).*

Large companies have their own unions (SP-BISCUIT, HU-PASTA_COOP). The work of the representatives is to advise and support the workers in their own dealings with the company, preparing

texts, regularising working conditions, etc., as well as representing all the workers in general (SP-BISCUIT, RegioPlus Consulting, 2017c). The analysis has shown that these worker representatives normally do not participate in the proposals or negotiations in regard to innovation, thus the union is not a conveyor of information or ideas in this respect. Their actions are only related to innovation in cases where this has important consequences on the job quality of the workers.

3.3 Innovation/job quality nexus

It has already been said that the agri-food industry is a sector which has been technologically stagnant in recent decades. Nevertheless, motivated primarily by the need to pursue a solution for the financial crisis and austerity measures, as well as by the new era of digital transformation, in recent years the technical modernisation of the industry has increased considerably. This fact has had direct – although without high impact yet - consequences on jobs and on working conditions.

Literature reminds us that there are many additional factors which affect the ability to determine a direct relationship between innovation and job quality, and that this depends to a great extent on the context, the people and the sector (Toner, 2011). In the cases in our sample, two interrelated factors seem to have an important influence on both job quality and on the strategies and possibilities of innovation: the ownership and management system of the company (family business, private company, co-operative, etc.), and its size (small, medium and large company).

In the case study SP-WINE_COOP the small size and the cooperative ownership facilitate adaptation of the working times to the workers to enable them to balance personal, family and working life whenever this does not interfere with the work being suitable carried out, especially more delicate tasks such as wine treatment (RegioPlus Consulting, 2017b).

> *"We are a family. The size of the company and the relations with the members allow family and working life to be balanced." (Blue Collar, SP-WINE_COOP).*

The case study report on the Spanish company SP-OIL_MILL shows the latest market innovation established by a family run group of companies. The family based nature of the company gives it a set of special characteristics such as the transmission of values and family culture to the working environment and the concept that the family company is a living project of several generations. The family always bets on innovation in their new companies (RegioPlus Consulting, 2017d).

> *"Before, I worked in another group company, the family found I had training in farming and pruning and that I have experience and really enjoy working in this area. So I went on to work at the farm. I'm really happy, I love the work, we're like a family and what's more I work right next to home and that lets me enjoy my free time that much more." (Blue Collar, SP-OIL_MILL).*

The key role of social responsibility and the inclusive approach of the management of the pasta factory (HU-PASTA_COOP) was necessary for the modernisation strategy. The continuous technological innovations involved the massive restructuring of the labour force and the use of knowledge (Kálmán et al., 2017).

In HU-WINE_EXPORT, the objectives of the Roundtable include the creation of an open and innovation-friendly professional environment that can benefit all involved by enhancing efficiency, increasing profitability, while enhancing employment and the working conditions of the employees by enriching the accumulated common knowledge base (Gubányi et al., 2017a).

The diversity of sub-sectors in the agri-food industry however signifies a large obstacle when it comes to generalising the conclusions reached in the fieldwork.

With regard to the agri-food industry, our case studies show that the rate of implementation of innovative actions or strategies have an effect on a limited number of dimensions of job quality, such as training, the need for new skills and profiles and workload, as indicated in Table 3. Despite the fact that Heijs and Buesa (2016) conclude that in 60% of the studies analysed in their report, favourable salary differences associated to the implementation of innovations can be found, it has not been possible to corroborate this fact in the case studies conducted for the agri-food industry. Additionally, no sector-wide effects have been detected in regard to work-life balance, inclusion, working hours, autonomy in employment, etc.

Therefore, the table below is followed by an analysis of the most significant interrelations identified between job quality and innovation. We have tried to compare it with existing literature, in order to provide solidity to the findings.

Table 3: Effects of innovation on job quality

Dimension	Indicator	Effect
Wages	Pay variability	No changes
Employment Quality	Permanent/Temporary Status	No changes
	Job Security	Positive impact
	Internal Progression Opportunities	Improvement in skills
	Working hours	No changes
Education & Training	Learning Opportunities on the Job	Positive impact
	Opportunities for General vs. Specific Skill Acquisition (Transferability)	Positive impact
Working Conditions	Individual Task Discretion/ Autonomy	No changes
	Job Variety	Multitasking in SMEs
	Work Intensity	Increase of intensity
	Health and Safety	Positive impact
Work-Life Balance	Work Time Scheduling (Unsocial Hours)	No changes
	Working Time Flexibility	No changes
Consultative Participation & Collective Representation	Direct Participation or Organisational Decisions	No changes
	Consultative Committees-Works Councils	No representative
	Union Presence	No representative

Source: Own elaboration

3.3.1 Volume of work, work intensity and wages

It was remarked earlier that a large part of the innovations implemented in the agri-food industry are linked to technology. The origin of these innovations is varied, but they contribute towards common goals of better sustainability of the industry and increased competitiveness. These goals are achieved either through cost containment (mechanisation and streamlining of processes, energy and other savings, etc.), the introduction of new processing and products or improvement in the quality of the final product.

This type of innovation has contrary consequences in the agri-food industries, so that – depending on the type of innovation – it may entail a reduction in workload or, on the other hand, an increase:

On the one hand, the technological innovations and the mechanisation of processes through the acquisition of new and modern technologies contributes to a reduction in workload, an increase in speed of processes and, generally, a reduction in the effort required for a certain task on the part of a certain worker or group of workers (SP-WINE_COOP, SP-OIL_MILL). This is in line with a general trend towards a reduction of cost, as identified by Muñoz de Bustillo et al. (2016).

In the interviews conducted in the case of the and state-of-the-art oil press (SP-OIL_MILL) the workers comment that thanks to the introduction of specialised and innovative machinery, they are able to respond more rapidly before problems arising in the farm (for example, pests) and can identify the exact moment when the olives are best for harvesting, thus increasing the quality of the final olive oil (RegioPlus Consulting, 2017d):

> *"When we started with the treatments we took 14 or 15 days and two shifts to do all the olive trees. We bought a new spray system and then it took us 6 days. Now with the new tractor we do the job in 3 days. We've reduced the treatment work a lot, if there's an epidemic, the reaction time is much shorter. And we're also happier in our work." (Blue Collar, SP-OIL_MILL).*

Literature often associates this kind of technological increase in efficiency with the loss of jobs. Nevertheless, in the cases included in our sample it has been impossible to corroborate that this effect is clear in the agri-food industry. In addition, some of the cases show that the work labour has been restructured in order to adapt it to the innovation changes avoiding layoffs.

In the pasta factory (HU-PASTA_COOP), despite the growing extent of automation, layoffs have been avoided in the company. The employees who could have been made redundant are still employed by using internal retraining. The automation of packaging primarily had its influence felt in regrouping labour force in egg packaging and egg selection. Nevertheless, as the authors of the case study emphasise, regrouping employees is not typical for the agri-food industry (Kálmán et al., 2017).

With regard to the effects of the innovation on employment in general at the biscuit company (SP-BISCUIT), it is actually associated to lesser needs for human resources. Nonetheless, innovation has contributed to improving the results of the company, and this has enabled reinvestment in the introduction of new product lines which have generated new jobs. This process, between 2002 and 2017, led to a rise from around 250 employees to more than 1000 (RegioPlus Consulting, 2017c). However, it has been possible to pinpoint in the cases studies that the process of implementation of innovation related to new products or improvement of processing usually entails an increase in the workload of employees involved in its development. To illustrate this point, the start up of pilot projects in the wineries analysed entails additional dedication in terms of time and resources for the treatment of the pilot plots assigned to the research projects (RegioPlus Consulting, 2017b).

> *"For my job it means a greater workload, though not as much as in other projects we have undertaken. I have to continue making the usual wine, and another new one at the same time, with specific analyses, etc." (Oenologist, SP-WINERY).*

Another example is the technical tests carried out in the biscuit industry to test new products (SP-BISCUIT). These tests have to be carried out in hours that do not affect continuous production, which implies that the worker has to adjust his/her timetable to such tests.

> *"We have to have a certain flexibility because we must fit the times we perform industrial testing around the activity of the lines of production, to adapt so as to hinder production as little as possible." (Blue Collar, SP-BISCUIT).*

This is in line with a general trend observed by Supervielle and Pucci (2008) who point out that in those companies which transform their own cultivated crops; there was an increase in workload.

In this regard, we found that the one-off increase in workload is not - in all of our cases -associated to additional compensation for the worker (salary or other).

> *"In terms of salary these projects don't have any consequences for me. But the projects are very interesting, I learn a lot about working with the vineyard and about the grape, it motivates me." (Blue Collar, SP-WINERY).*

These results corroborate, to a certain degree, the conclusions of *EWCS 2015* which indicated that in companies of the agri-food sector, employees work a greater number of unsocial hours (weekends, nights, etc.). Within the group of companies in our sample, it is a characteristic associated to a greater extent with those industries linked to farms.

3.3.2 Training and new skills

Without a doubt, the **acquisition of new skills** is one of the factors of job quality which has been observed most often and is directly and positively influenced by the rate of innovation in all the case studies.

Given the specific nature of the tasks to be carried out in working with the crop, the winery needs to have qualified personnel who they train, and therefore, it is necessary to have specific profiles (SP-WINERY, RegioPlus Consulting, 2017a).

The degree required for the personnel specific to innovation, within the R&D department of the biscuit factory, is normally Food Science and Technology. When so required by the development of a given innovation, specific training has been given to the workers (SP-BISCUIT, RegioPlus Consulting, 2017c). A process of professionalisation of the workforce is under way. The need and appropriateness of having properly trained personnel has been detected, so that there is currently a biannual training plan, a dual internal training process in which veteran personnel of the company instruct new employees, and an agreement to conduct the training processes with other entities and technology centres. Among the achievements, there is the drive for the Professional Baking and Biscuit-making Certificate approved by the Ministry of Education, Culture and Sport. The idea is that the majority of the personnel of the company should hold this certificate, which is currently possessed by 70 workers.

Regardless of the type of innovation, it usually requires additional knowledge or a training process on the part of the worker. This fact has been observed in literature by various authors, as pointed out by Toner (2011). Also Benavides (2007) assures that knowledge and experience are important when it comes to establishing and strengthening productive and innovative networks.

In general, both small and large companies have an established training scheme or programme, so that the worker can participate in it on an annual basis. In the case of small companies, it is common for training to be outsourced. In the case SP-WINE_COOP, the training of the workers is based on the qualifications required for the job profile and the completion of the tasks required by the company at the time of contracting. There are also ongoing training activities (although there is no formal program) with two clearly differentiated branches (RegioPlus Consulting, 2017b):

- Training received by workers with the inclusion of new technology (normally included with the purchase of machinery) geared towards effective use of same and maximising output.
- And participation via the "Fundación Tripartita". The principal mission of the foundation is to promote, coordinate and further the training of workers in companies. The mode in which it operates is by granting loans to companies so that they can invest in training for their employees.

The acquisition of new skills may be one-off, for example, the training entailed for the use of a new machinery or technology, or can be more prolonged, such as learning of a language in a context of internationalisation of companies. In the pasta factory (HU-PASTA_COOP), the smooth use of new equipment requires the regular professional development of employees. On the one hand, the suppliers of the new machines are training operators and they also assist in installation when it comes to a new technology. On the other hand, through in-house training courses, experienced colleagues are training the new, inexperienced staff: this is the practice of on the job training (OJT). These are typically technical trainings with the participation of maintenance staff and operators (Kálmán et al., 2017).

The literature analysis conducted by Heijs and Buesa (2016) indicates that 62% of the empirical studies show an improvement in the qualification of workers, which is associated to an improvement in job quality. Nevertheless, innovation is not the only factor which implies the acquisition of new skills, as assured by Toner (2011), who points out that the level and type of workforce skill are the result of many causes, of which technical change – or, more broadly, innovation – is only one.

In the case HU-PASTA_COOP the innovation was accompanied by a training programme developed by the human resources department, and at the same time, the acquisition of new skills supports the emergence of innovative ideas by workers. It should be pointed out that it is a **circular and incremental interrelation**, so that the fact of increasing the qualification and skills of the professionals can, in turn, lead to new innovations, given that greater experience implies a more detailed knowledge of processes and procedures. This fact is corroborated by the findings of Montoya (2015), who indicates that in an integrated innovation management system, knowledge management and technology management have a positive influence in the management of creativity and that the latter has a positive influence on innovation of products and processes. Furthermore, there is positive effect between the management of knowledge and of technology, and between innovation of products and of processes. Similarly, Kababe (2013) pinpoints that innovative behaviour may be explained by the incremental learning process through interaction. Toner (2011) also concludes that skills and knowledge are both input and output of innovation: Implementing a particular innovation often requires training a workforce, and use of a given innovation by the workforce in production and consumption gives rise to incremental improvements to the original innovation. Kim (2002) pointed out that *"an increase in the supply of skills can generate skill-based technical change".*

Due to workforce limitation some workers assume different tasks (multitasking, SP-WINE_COOP) in the small and medium-sized companies. Certain workers accumulate the new skills acquired and needed for the implementation of innovation (Eurofound, 2015).); therefore, there is an increase in job responsibilities.

> *„When a new technological feature is introduced, it may be necessary to reorganise the internal working structure." (Oenologist, SP-WINE_COOP).*

As they are a small company, all the new tasks that the technology involves are assumed by the same 5 employee of the winery.

To a certain extent, it can be said that a higher level of training and skills can, in the long term, have a direct influence on career options in the industries, especially in those large companies where the worker has more options for advancement.

3.3.3 Creation of new jobs and emergence of new profiles

Work stability in the agri-food sector is a characteristic factor observed in the literature (*FoodDrinkEurope, 2016*) and corroborated by the case studies conducted. This stability translates in a

high percentage of indefinite contracts. The analysis of the case studies has also shown that there is a majority of full-time contracts. The biscuit factory (SP-BISCUIT) opts for permanent contracts, with around *93% of the employees engaged under these conditions* (RegioPlus Consulting, 2017c).

Temporary-term contracts are more typical for industries linked to farming, given that the characteristics of the different crops imply seasonal peaks of work (such as harvesting, pruning. etc.) which require extra workers. But in any case, from small to big companies, employment stability has been observed in the case studies. The innovation creates more competitive companies which contribute to the maintenance of the labour.

> *"In the winery, there are 28 of us who are permanent, though if you calculate the permanent discontinuous workers in terms of annual full-time equivalent contracts of 1700 hours, there are more than 40 of us. Here it's very seasonal, the land has moments with lots of work, such as harvest and pruning times. We have a lot of people who work about 800 hours per year every year." (Technical Director, SP-WINERY).*

Regarding the job creation, the case studies show that the new contracts generated because of specific technological or product innovations are temporary contracts in small companies, in order to train the workers of the industries how to lead with the innovation. But this conclusion can´t be generalise to all innovations and different companies of the agri-food industry.

In EU28, as shown in EWCS of 2015, 76% of women workers and 82% of male workers have an indefinite contract. This same survey indicated that only 5% of men and 30% of women have a contract of 34 hours or less. The majority of the interviewed women with part-time contract in the case studies indicate that the motive for applying for a part-time contract has been work-life balance.

The new era of digital transformation has already had effects on the new profiles, more akin to communication and technologies. This fact was corroborated in the case studies conducted. The volume of new persons hired associated to innovation cannot be highlighted as a relevant conclusion, except in the cases in which the introduction of new processes and products have entailed an important increase in productivity and profitability of the company, as is the case of the Spanish biscuit factory (SP-BISCUIT). In this company, the introduction of a new healthy product has prompted a new line of business which has increased the profit of the company and has led to an important increase in the number of workers. But it is considered exceptional in this type of cases, associated to a greater extent with large companies.

Nevertheless, in some of the smaller companies in our sample, workers have also been hired. In the case of the Spanish winery (SP-WINERY), the new innovation projects implemented usually entail an additional workload for the team responsible for working on the land, especially before the moment of harvest. As an indirect consequence, more personnel are hired, not to carry out the extra work of this project, but to collect the grapes from the rest of the plantation. Thus the senior workers can manage the innovation projects as it requires more knowledge and properly manage. In this example, it can be seen how the hiring of new workforce has implied a relocation of the senior workers in the company.

In this regard, in the cases in our study the new profiles hired in the majority of cases require new skills which have not to date been incorporated in the agri-food industry. They are more engineering-based profiles, often focused on dealing with technology, digitalisation, communication and marketing (SP-BISCUIT, HU-PASTA_COOP). In other words, it goes to show the need to hire qualified workers, with a higher level of education, who can meet the technical requirements of the moment. Technical modernisation of processes has meant, therefore, the need for more qualified profiles.

At present, there are 132 different jobs at the pasta factory (HU-PASTA_COOP). Recently, tasks in certain jobs were enriched to make them more attractive and even their names have been modified (Kálmán et al. 2017). For example: laboratory assistant is now quality controller, programmer is now IT development specialist. The use of new technologies resulted in new jobs (e.g. technician, process engineer). When examining the last 10 years it can be concluded that with the emergence of new jobs the proportion of employees with higher and secondary education has increased.

> *„Nowadays it is not enough if someone wants to work so much – although it is a very important condition which is hardly met – but proper technical qualification is also a must." (Director of the Pasta Factory, HU-PASTA_COOP).*

This is in line with earlier research. Supervielle and Pucci (2008) indicate that new technologies introduced, in turn, important modifications with regard to work organisation and worker composition. The new working conditions require greater knowledge, more responsibility, more heedfulness, greater dedication and versatility. This can also lead to skill shortages, as the example of the Biscuit company (SP-BISCUIT) shows: At this company, the R&D department consists of 7 persons, all women, and the idea that additional personnel could be incorporated to cover only the peaks of activity is considered tricky. The peaks of activity occur when a customer demands a variation of their products and the department has to develop a variation of them in a short period of time. The technical training the personnel must have is highly specific, and it is not possible to find sufficiently well-qualified professional profiles (RegioPlus Consulting, 2017c).

The description of the industry already remarked that it is a predominantly male sector (Eurofound, 2015). It seems that the inclusion of women is not being fostered in the digital era. Although this cannot be generalised, in the particular case of HU-PASTA_COOP the profiles of engineers have been occupied by men in recent years. Kálmán et al. (2017) indicate that because of recent technological advances, there has been an important shift in the gender composition of employees. Of the different activities of the company, egg production is still dominated by women labour force. However, when looking at the overall share of women, their number has decreased. The proportion of women was 40 percent in 2010, which was decreased to 34 percent in 2016. There are professions where men dominate such as electronics, technology and maintenance. With the popularity of engineering skills, the ratio of men has increased in the labour force.

The inclusion of young people in companies is not clear, although there exist an interrelation between the new contracts engaged and relatively recent training profiles in the case of the pasta factory (HU-PASTA_COOP), such as all those related to information and communication technologies.

To ensure long-term labour supply, the company organizes joint programmes with the local authorities, elementary school and regional institutions of vocational training. The Local Government together with the firm tries to identify the professions in shortage and financially support apprentices to select and learn these occupations. The objective of this joint initiative is to provide the students of secondary or higher education - with a permanent address in the rural area - with scholarships to help support the local labour market.

Within the framework of the agreement with the local elementary school, students can take part in professional career days where not only production processes are demonstrated but also machines can be tried. On these career days, students could try the different bar code readers, and even programme robots. The objective of such events is to get potential future colleagues acquainted with the work processes of the factory and inspire them in the future to be engineers, mechanics or electricians.

The company is also active in organising dual training according to which they accept two students for a year from local university who would work with them for experience (Kálmán et al., 2017).

As indicated previously, the interrelation between the agri-food industry and the rural environment where it is usually located should be highlighted. Therefore, in addition to contributing towards maintenance of economic activity, heritage and environment of these rural areas, the case studies analysed underline that the hiring of personnel, whether temporary or permanent, is covered as far as possible with workers from the area. Thus, the bond between the industry and the environment is increased, becoming a unique source of employment and sustainability of the rural environment and of the families who live there.

In SP-WINERY the temporary contracts during pruning are mostly offered to the same people every year. In the harvest season, however, the personnel vary more, around 25% of them coming back every year, depending on the availability of temporary workers (RegioPlus Consulting, 2017a).

3.3.4 Other aspects of the quality of the work

Highlight the subjective perception obtained in the case studies with regard to the positive quality of work should (at least for blue collars workers). Even innovations which lead, as observed, to an increase in workload without additional compensation are understood by the worker as part of his/her daily activity and as a necessary task for the sustainability of the company and, therefore, his/her job. The case studies show that job satisfaction is determined by several factors, one of them is the possibility of be leader and innovative in their sector.

> *„You see how interesting the innovation project is, the more projects the more we're going to know about the product. I like to develop those kind of projects“ (Oenologist, SP-WINERY).*

In the biscuit factory case study SP_BISCUIT, it can be concluded from the interviews conducted that workers are satisfied with their jobs. The location of the company in a rural environment means that it is a secure professional option in an area with few employment possibilities (RegioPlus Consulting, 2017c).

The interviews conducted in the case study SP-WINERY show that people who work at this company are aware which the peaks of work, and accept, for example, that during the harvest season all have to work longer hours than those established. It should be said that the satisfaction of the workers is linked to other kinds of improvements and the fluid communication that appears to exist in the winery, which could be described as possessing a family working environment (RegioPlus Consulting, 2017a). The interviewed workers at SP-OIL_MILL generally expressed satisfaction with the quality of the jobs at the business group. Ideas that were expressed included the trust that the company placed in its workers, satisfaction with the salary, the possibility of working in different companies of the group, etc. (RegioPlus Consulting, 2017d).

In this regard, in the Spanish case studies, the fact that the majority of agri-food industries are small and medium-sized companies contributes to a certain extent to this positive perception of job quality in those industries where the relationship with management is friendly and fosters communication (SP-WINERY, SP-WINE_COOP, SP-OIL_MILL). Relationships are generated between the workers and employers which are almost familiar, characterised by closeness and understanding.

> *“I'm really happy, I love the work, we're like a family.” (Blue Collar, SP-OIL_MILL).*

> *”In terms of salary, I can't complain, I've never had to ask for anything, they give it to me first. The company trusts me and I can make my own decisions. If I have to work more*

hours I do it because I have a responsibility to fulfill." (Farm Worker, Blue Collar, SP-OIL_MILL).

”I'm fine, I think I have good job quality. I've been here for 21 years and this is a company that supports people's work. I have been growing with the company and you evolve along with it. It's like a single piece. Every time I needed something, the company supported me." (Oenologist, SP-WINERY).

In the case study of the wine cooperative (SP-WINE_COOP) labour issues that arise in the company are usually resolved via informal channels favoured by the "almost family" relations that exist between the workers (with greater or lesser responsibility in the company structure), as well as with the members of the Governing Board (RegioPlus Consulting 2017b).

Meanwhile, literature shows that workers of the agri-food sector enjoy a more positive social environment than the average in Europe (Eurofound, 2015).

4 Conclusions and recommendations

The agri-food industry is the largest manufacturing sector in EU28, providing employment for 4.24 million persons and characterised by its fragmentation, where SMEs make up for around 40% of turnover and 62.8% of employment created.

The agri-food industry faces the great challenge of feeding a growing world population in a healthy and sustainable manner. EU-wide, this sector has been affected by political changes in recent decades, including the incorporation of new eastern European countries to create EU28 and the economic crisis of 2008 with consequent austerity measures which are still in effect in certain countries today, especially those of the Mediterranean area.

The agri-food industry has gradually adapted to the needs both of the market and of politics. In the face of such important changes as the opening of markets or the new era of digital transformation, the agri-food sector has found itself in the need to incorporate innovation and job quality in its business strategies in order to ensure competitiveness. Therefore, this is a sector which adapts to the changes occurring around it.

4.1 Main conclusions of the study

The comparison between the case studies conducted in Hungary and Spain have led to the identification of certain factors which influence the design and implementation of innovation strategies, while conforming the employment policies in the agri-food industry. Eight factors have been identified:

– Ownership and management system of the company (family business, co-operative, private company, etc.), influenced to an important degree by the political context. There is evidence in the reviewed literature which confirms the importance of these factors in the process under scrutiny; namely, our findings suggest that the structure of the company can encourage or hinder the participation of workers in the improvement of their own working environment and in the innovation process. In this regard, our findings show that, in general, in all company types, innovation is fostered, although co-operativism and the family business stand out for the better communication between workers and managers and a governance which encourages an innovative spirit. In fact, in several of the family businesses studied, innovation has emerged in this line (SP-BISCUIT, SP-OIL_MILL, HU-WINE_ASSOC). The influence of the ownership has been also detected in the cooperatives case studies (SP-WINE_COOP and HU-PASTA_COOP).

- Company size: the agri-food industry is characterised by its fragmentation, a fact which has been analysed as a limit to the competitiveness of companies and innovative processes. Of the case studies carried out, only the largest companies have their own R & D department (SP-BISCUIT and HU-PASTA_COOP).
- Relationship with the environment: it is a fact that the majority of agri-food industries are located in the rural environment, providing a source of employment and development in these areas (SP-WINERY, SP-BISCUIT, SP-OIL_MILL, HU-PASTA_COOP, HU-WINE_ASSOC and HU-WINE_EXPORT). Furthermore, the origin of product processing in various analysed cases is associated to a farm and, therefore, to a local product and to a specific environment and climate (SP-WINERY, SP-WINE_COOP, SP-OIL_MILL, HU-PASTA_COOP, HU-WINE_ASSOC and HU-WINE_EXPORT).
- Importance of co-operation: linked to the fragmentation of the sector and the limitation that this means for research and development, networking arises as support and a required source of innovation. In the case of the Spanish biscuit industry, its collaboration with technology centres and universities generates positive synergies over innovative processes (SP-BISCUIT).
- Exports: the opening of markets and the political context has led to the need for internationalisation of the agri-food industries. This fact has meant the adjustment of companies to the new scenario. From the case studies made it follows that one of the reasons and consequences of innovation is the export of production to new markets (SP-WINERY, SP-BISCUIT, SP-OIL_MILL and HU-PASTA_COOP).
- Business diversification: another of the resources which the agri-food sector has used to increase its competitiveness has been diversification especially that geared to tourism. This is the case of the case study of the Spanish mill (SP-OIL_MILL), which tries to take advantage of the opportunities offered by tourism in the island where it is located and the winery that offers guided visits to its facilities (SP-WINERY).
- Access to financing: access to the financial resources required for the incorporation of innovation in companies is identified as a limitation. The use of fixed items in the corporate budget for innovation has only been detected in the case studies of larger firms (SP-BISCUIT and HU-PASTA_COOP).
- Also shown is the important role played by governance and communication flow between management and workers when it comes to the design and improvement of innovative processes, especially in a context where small and medium-sized companies prevail (SP-WINERY, SP-OIL_MILL). Due to this fragmentation, the role of unions and worker representatives in the sector is not considered relevant in these governance processes.

The innovations implemented in the agri-food industry respond to new consumer demands (new industrial processes and new products) (SP-WINERY, SP-BISCUIT, SP-OIL_MILL, HU-PASTA_COOP), to the sustainability of the industry (SP-WINERY, SP-WINE_COOP, HU-PASTA_COOP, HU-WINE_ASSOC, HU-WINE_EXPORT), as well as to the changes in information and communication technologies primarily (SP-BISCUIT, HU-PASTA_COOP), job quality not being a basic motivation for innovation.

The research conducted shows impact of innovation in job quality in four main aspects:

- The workload or work intensity. In this regard, there are two contradicting realities. On the one hand, technological implementation usually prompts a reduction in manual workload and an increase in process speed (SP-WINE_COOP, SP-OIL_MILL, and HU-PASTA_COOP. And, on the other, during the process of introduction of the innovation, an increase in workload is generated for the workers involved. Examples of this are the cases of the Spanish winery (SP-WINERY) or biscuit factory (SP-BISCUIT).
- Training and acquisition of new skills: it has been shown that in all of the cases in our sample, innovations required additional knowledge or training for the worker. Moreover, this is a circular

relationship, so that the increase in knowledge influences in turn innovative behaviour. In the case of the Hungarian pasta company (HU-PASTA_COOP), the innovative spirit instilled favours that the workers themselves propose, in turn, new ideas for improvement. This is associated in an increase in job quality.

- In small companies, there are processes of concentration of skills and tasks in a same worker (multitasking) as can be observed in the small wine co-operative (SP-WINE_COOP).
- New jobs and emergence of new profiles: the agri-food sector is characterised by the stability of its contracts, as have been shown in the interviews and in literature (SP-WINERY, SP-BISCUIT, SP-OIL_MILL, HU-PASTA_COOP). The innovation creates more competitive companies which contribute to the maintenance of the labour. The effect of digital transformation has not yet had consequences on job creation, but it has had an effect on new profiles (SP-BISCUIT, HU-PASTA_COOP), with the tendency to hire more qualified workers, with higher education and of an engineering or technical slant, as occurs in the Hungarian pasta company which has reached a high degree of technical modernisation in recent years. Furthermore, in the cases included in our company sample the creation of new jobs were associated to innovations in new products and processes. New hiring has encouraged the hiring of local workers, thus contributing to rural development. All of the companies analysed hire local workers and, for farming-related fixed-term contracts, there is an endeavour to hire the same people each season.
- Other aspects of job quality: Job satisfaction in the companies in our sample is high, but not necessarily due to the innovations but to other factors as social environment, close family-like relationships, etc. Although both in bibliography and in the study conducted, a positive correlation has been found between innovation and the job satisfaction indicated by the workers (SP-WINERY, SP-WINE_COOP, SP-BISCUIT, SP-OIL_MILL HU-PASTA_COOP).

To conclude, certain good practices are fostered which increase job quality of the worker and in turn generate an environment that is favourable for innovation. Examples of these practices are governance processes, such as the "idea box" explained in this article, or training schemes adjusted to the needs of the worker.

4.2 Recommendations

In order to promote the innovation strategy in the sector and take advantage of the positive synergies generated with employment (both in terms of quantity and quality), there is a need to boost promotion of certain aspects. This takes us to compile a series of good practices identified in our case studies that seem to have benefitted companies' innovativeness, employment levels and job quality and may therefore serve as benchmarks for companies and political programmes:

- Facilitate access to training for workers as mechanism for promoting worker motivation and innovation in the industry (SP-BISCUIT, SP-OIL_MILL).
- Promote the workers collaboration with research centers as source of knowledge and adaptation to market demands, especially in the case of small and medium-sized enterprises that lack their own R & D department (SP-WINERY, SP-BISCUIT, HU-WINE_ASSOC).
- Promote the cooperation with other companies within the industry to develop together I&d&i and marketing projects in order to reduce the cost of the investment and to increase the impact of the results (HU-WINE_ASSOC, HU-WINE_EXPORT). The creation of an open and innovation-friendly professional environment that can benefit all involved, by enhancing efficiency, increasing profitability, while enhancing employment and the working conditions of the employees by enriching the accumulated common knowledge base.
- Increase labour flexibility (in terms of improving the adaptation on working time to workers requirements/restriction, in order to allow for better work-life balance as a strategy to boost

workers motivation, especially in the case of industries that have workloads that need the involvement of workers (SP-WINERY, SP-OIL_MILL).

- Prioritize the development of innovative and research projects (SP-WINERY, HU-PASTA_COOP).
- Foster the participation of workers in fairs, workshops and meetings that promote the knowledge transferability. Programming of periodic meetings at the internal level that allow transferring these news to the different departments of the company (SP-WINERY, HU-WINE_ASSOC).
- Involve the senior workers with a large experience in the company in the innovations as a motivation for the professional career (SP-WINERY, SP-BISCUIT, SP-OIL_MILL, HU-PASTA_COOP).
- Establish an annual budget for innovation, ensuring that the company make financial and human resources available for this initiatives (SP-BISCUIT).
- Develop relations with other industries (such as tourism) capable of reducing the seasonality of companies linked to agricultural production, while facilitating the maintenance of the labour (SP-WINERY, SP-OIL_MILL, HU-WINE_ASSOC).
- Create specific mechanisms to the workers can to propose innovative ideas, such the “idea box” concept of the Hungarian pasta company (HU-PASTA_COOP).

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6 List of Case Study Reports and Industry Profiles

Case studies	
HU-WINE_EXPORT	Gubányi, M., Makó, C. and Illéssy M. (2017a). *The 'Kadarka Roundtable' Initiative: Social and organisational preconditions of cooperation in the context of individual competition*. Case Study Report for WP6 of the QuInnE project. Unpublished manuscript.
HU-WINE_ASSOC	Gubányi, M., Benke, M., Makó, C. and Illéssy M. (2017b). *Villány-Siklós Wine Road Association as a Driver of the Regional Social-Organisational Innovation*. Case Study Report for WP6 of the QuInnE project. Unpublished manuscript.
HU-PASTA_COOP	Kálmán, A., Makó, C., and Illéssy, M. (2017). *Pasta Factory: Inclusivity Driven Continuous Technological Innovation.* Case Study Report for WP6 of the QuInnE project. Unpublished manuscript.
SP-WINERY	RegioPlus Consulting (2017a). *Winery.* Case Study Report for WP6 of the QuInnE project. Unpublished manuscript.
SP-WINE_COOP	RegioPlus Consulting (2017b). *Winery Cooperative*. Case Study Report for WP6 of the QuInnE project. Unpublished manuscript.
SP-BISCUIT	RegioPlus Consulting (2017c). *Biscuit Factory*. Case Study Report for WP6 of the QuInnE project. Unpublished manuscript.
SP-OIL_MILL	RegioPlus Consulting (2017d). *Oil Mill*. Case Study Report for WP6 of the QuInnE project. Unpublished manuscript.
Industry Profiles	
Hungary	Kálmán, A., Makó, C., and Illéssy, M. (2016). *Industry profile: Agri-food Industry - Hungary*. Report for WP6 of the QuInnE project. Unpublished manuscript.
Spain	RegioPlus Consulting (2016). *Industry Profile: Agri-food sector – Spain*. Report for WP6 of the QuInnE project. Unpublished manuscript.

7 Annex – Summaries of Case Studies

SP-WINERY (RegioPlus Consulting, 2017a)

Brief characteristics of the companies' structure and business strategy

Origin and enterprise: Winery founded in 1990. Anonymous society

Number of employees: < 50 permanent, ~15 % part-time

In 1990, the winery was founded. At the same time, it set up its own vineyards with the idea of respecting and safeguarding the identity of the wine of O Rosal. The winery has evolved considerably both in production and different kinds of preparations of wine, always using native varieties.

The winery does form part of a group of companies, among which is a company that processes Galician products and two other winemakers created subsequently, as part of the commercial strategy pursued by the company.

The foundational premises used by the winery to create its wine are: continuous care and monitoring of the vines during their growing cycle, winemaking with each of the varieties separately and fermenting with native yeasts isolated and selected from the winery itself (some of these yeasts have been patented following research projects, as will be commented upon later).

Recent major innovations

Since the year 2000, the company has participated in numerous research projects, financed with its own resources and regional, national and European funding. These projects are always aimed at knowing more about the vine so as to yield a wine of high quality. Two of these projects have been related to food. In the first of these, which gave place to the second, the molecules with anti-tumour and anti-metastatic effects were identified. Currently, they aim to identify which ways of working the vineyard increase the concentration of those molecules beneficial to health in the wines as well as in other products of the process.

Innovation-job quality nexus

The effect of this project is bound up with the quality of the wine. Therefore, it has an indirect impact in relation to job quality. As consequences:

- The increase in workload entailed by organizing the pilot plots selected should be highlighted, especially during the moments of pruning and collecting the grapes.
- Given the specific nature of the tasks to be carried out in working with the crop, they need to have qualified personnel who they train, and therefore, it is necessary to have specific profiles.
- Another inherent consequence is that given that these profiles are responsible for collecting and handling the grapes from the pilot plots, extra personnel must be taken on for the traditional grape collection.
- In addition, the commercial team uses this reputation for engaging in research projects to foment communication in sectors other than winemaking, for instance, in the scientific press. This therefore represents added value when commercializing the product.

SP-COOP (RegioPlus Consulting, 2017b)

Brief characteristics of the companies' structure and business strategy

Origin and enterprise: Cooperative founded in 1930s

Number of employees: < 10 permanent

The old Cooperative was founded in the 1930s, when a group of local winegrowers came together with the aim of responding to the growing demand for wine from the rapidly expanding city of Madrid.

The organisational structure is characterised by a high level of participation, with integration of the members in organisational management.

In the early 80s, the company started to bottle wines with the Designation of Origin of Madrid (it was one of the pioneers in this regard) and has reached the point where it is now a producer of a complete range of wines with a designation of origin.

Important innovations in recent past

The most important innovations over time have been organisational innovations, and more recently, innovations given over to the acquisition of machinery and chemical treatment processes. In any case, such innovations have respected the production parameters established by membership of the Designation of Origin for Wines of Madrid.

Key findings on interrelationships between innovation and job quality, employment and inclusiveness

The innovations have made impact more than anywhere on the improvement of product quality, but only in a marginal sense on job quality. In this regard a change has taken place in the structure and distribution of tasks, mainly in the harvest period, leading to an increase in the volume of work at this period, which has been resolved by increased overtime.
On the other hand, tasks have been facilitated/simplified in post-production phases, without any changes to the volume of work or therefore to working hours.

SP-BISCUIT (RegioPlus Consulting, 2017c)

Brief characteristics of the companies' structure and business strategy

Origin and type of activity: A family business which was the pioneer in the manufacture of biscuits

Number of employees: > 1000 (Permanent: 56%)

The company boasts panoply of products which ranges from the traditional biscuits for breakfast, to a complete range of healthy biscuits, in the production of which it leads the sector: wholegrain, with fibre, low-calorie, organic, cholesterol-free, chocolate-coated, wafers, sandwich biscuits, cookies, etc.

In view of all this, the company has sown the seeds to maintain its position of leadership in the sector, covering the possibilities of the national market, and basing its future growth strategy on exporting. Its investments in technical and human capital mean it is a modern company. Thanks to this, the valuation of the company is high in aspects such as salary level, quality of employment, or working day.

Important innovations in recent past

Currently, the company is focussing, among other things, on replacing the fats in biscuits by healthier oils. It already has product lines of this kind developed, and the objective is to end up by integrating them into all the lines of production.

Key findings on interrelationships between innovation and job quality, employment and inclusiveness

Development of the innovation activity in the company is characterised by the following features:

- A constant investment in innovation representing 3% of the annual budget.
- A specific R&D department employing 7 people.
- Transversal activity affecting all the departments of the company and which demands constant coordination: from the creation of the new product at the R&D department, passing through checking of the issues related to food safety, identification of the needs in human resources, in production machinery, and selection of marketing actions and access to the market.
- The personnel involved in developing innovation have constant needs for training which affect not only the R&D technicians, but all the operatives and technicians who work on the innovative product lines.
- Ongoing need to be up to date with the novelties arising in the market so as to continue being a benchmark for the sector. This makes it necessary to keep up constant communication with universities and research and technology centres.

SP-OIL_MILL (RegioPlus Consulting, 2017d)

Brief characteristics of the companies' structure and business strategy

Origin and type of activity: Family group of three companies dedicated to food: one canning company, one dedicated to the packaging of olives and a third, initially bottled and distributed oil that has now been incorporated into direct production.

Number of employees: Small enterprises (less than 50 workers: 94% permanent)

The male head of the family was responsible for the group's origins, and the aim from the outset was to link work on the land with ownership of farms. With this the family chose to develop a business that was linked to the family tradition of high-quality, hand-made farm produce. The firm commenced in the sixties with the production of capers.

Their future project is to carry on working on high-quality foods to continue growing, further enhance their presence in national and international markets and make use of the opportunity presented by the importance of the region as a tourist destination to promote themselves. The reputation of the company is high in aspects such as salary level, quality of employment, or working day.

Important innovations in recent past

Production at the farm has been on a super-intensive basis, so as to achieve the best quality oil with the highest production levels of olives, reduce the need for labour and facilitate treatment and collection of the product. For this, the latest technology has been installed in the mill. The mill was built in such a way as to make it possible to visit the entire complex for tourists.

Innovation and job quality nexus

The main results obtained thanks to the commitment to innovation are the following:

- Diversification and addition to the business activity of the group via the creation of a new high-quality product with the D.O. Oli de [region] brand.
- Production of an extremely high-quality product under a super-intensive cultivation and control format of production by sectors that enables greater production combined with best possible quality. All these efforts have led to the product receiving the Oli de [region] Designation of Origin.
- Three specific jobs have been created and other posts already in the company have been given additional work.
- Technology provisions in the daily work of the farm and mill have reduced the time required for work and the response time to certain situations, facilitated work in the fields, improved job quality, etc. At the same time, the technology has brought about a reduced need for labour.
- The general satisfaction of the workers already employed in the company has improved considerably, as they feel a particular interest in developing this product.

HU-PASTA_COOP (Kálmán et al., 2017)

Brief characteristics of the companies' structure and business strategy

Origin and enterprise: Founded in 1950's as an agricultural cooperative

Number of employees: < 250 in the pasta company

The company can be found in the Central Transdanubian region of Hungary. The main activity of the company is pasta manufacturing. The turnover of the pasta factory amounted to 32 thousand tonnes in 2016, which was 60% higher than in 2010. With its 35 percent share in the dried pasta market, the company is a market leader in Hungary. With 140 million eggs produced annually on three farms, it can also be regarded as the largest egg producer of the country. Half of the eggs (75 million) are sold in their shells while the other half in the form of fresh eggs is used in the pasta factory. The enterprise is involved in integrated plant production on approximately 8800 hectares in the region. In addition, it also deals with forage production (23 thousand tonnes/year) and grinding in mills (140 thousand tonnes/year). The company group employed altogether almost somewhat less than 500 persons in 2016 and prefers employing those who live in the village or the nearby settlements that used to be part of the former agricultural cooperative, the legal predecessor of the company.

Recent major innovations

The construction of a new pasta factory and a warehouse is currently ongoing. With the new pasta factory, it doubles the capacity (it can produce 65-70 thousand tons a year), most of which is to be sold abroad. The capacity of the dough manufacturing complex will exceed the size of the entire pasta consumption in Hungary, and a pasta factory, which is the most efficient, will be established at the European level at the beginning of 2018.

The automatic high-warehouse can accommodate 11 600 pallets. With the investment, existing storage capacity will also be doubled, as it will be able to store more than 3000 duplicate sheets from 8200 stacks in the new warehouse. The investment is based on state-of-the-art automated technology, and has expanded the number of 500 employees currently working in the Group with 20 new jobs.

Innovation-job quality nexus

- Technological developments have created new types of labour demand. With regard to school education, qualifications and specialised skills are becoming increasingly important, especially in technical fields.
- New jobs have been created using the new technologies (eg.: technologist, process engineering).
- Over the past 10 years, the importance of training has been extremely intensified. This learning process is both induced by organisational and technological innovations.
- With the increasing mechanicity, the emphasis is on labour safety.
- Over the years, and the technological advances, the gender distribution has changed. The proportion of male employees grew by the spread of technical jobs.

HU-WINE_ASSOC (Gubányi et al., 2017a)

Brief characteristics of the companies' structure and business strategy

Origin and enterprise: Small family business in wine and hospitality sector since 1990s
Number of employees: The enterprise primarily has blue collar employees; white-collar employees include the owners and the management. The number of blue-collar workers fluctuates depending on seasonal labour demand.

The business possesses a 60-hectare area, and has premium category wines. They have focused on redefining old wine varieties. The sales of their wines have been linked to gastronomy, wine tastings, wine-university. This is the organisational-managerial (marketing) innovation of the winery. The culture of the local wine tourism, the Villány-Siklós Wine Road Association makes the work of the winery easier. The ICT like online reservation system, Vine Guard system based on software-supported monitoring system is an important source for innovations. The central player in the development and innovation processes of the winery is the owner-manager who shares her practical knowledge with the members of the winery. The owner-manager has always been consulting with the Villány-Siklós Wine Road Association, advisors and experts from outside, professional communities with other wineries. She is in constant touch with the accountants, economists, bookkeepers of the capital city. She is member of Master Mind group, which works via Skype. The organisational and technological innovations have resulted in the appreciation of trainings, studying, team work and have increased both balancing the workload and incomes.

Recent major innovations

The Wine Road is a tourism product in the form of a thematic journey into a wine region. It is based on local initiatives and cooperation, and works as an association. Launching the products of The Wine Road to the market is eased by community marketing, its services and standards meet the international requirements. The Association is an organisational innovation. The Association was established in 1994 by strategic partnership of the stakeholders of Villány and Siklós mini-regions, and it includes wine producers, mayors, county politicians, university teachers and researchers, tourism professionals. The EU Phare programme funded the Wine Road and financed hospitality, tourism trainings, and provided the entrepreneurs with interest-free credit. The Wine Road has qualifying system based on the qualifying system of the European Wine Road Association and chart. The number of qualified members has increased since 2000 and by now 14 settlements have joined the initiative. By meeting European tourism standards, the competitiveness of the enterprises may be enhanced. The Association coordinates the economic, gastronomy and cultural services provided by its members that make local producers, such as P. F. W., more competitive. The Wine Road creates jobs. Its innovation strategy means ICT-based community marketing activity in which Facebook, the website of Villány Wine Region and different mobile applications play a great role. The Association promotes the regional presence of the wineries and popularize local wine consumption. The Association is the tool of collective learning by trainings. The cooperation and collective performances supplementing individual competition can favourably influence the learning and innovation ability of the Association.

Innovation-job quality nexus

After the radical social-economic regime in Hungary opportunities challenged family wineries to gain experience within and outside the country to improve wine making and marketing-sales through innovation and collaboration. The Wine Road Association has been playing a central role in organising production, sales networks and strategic cooperation. The Association positively influences the improvement of the market position of producers and service providers by means of its accessibility, visibility, contractual and non-contractual relations, information exchange and its unique regional quality tourism product.

HU-WINE_EXPORT (Gubányi et al., 2017b)

1. Brief characteristics of the case

The Roundtable is a bottom-up, evolutionary initiative, a cooperation of family wineries from Hungary, Slovakia, Romania and Serbia. The cooperation is five years old, and has 8 main members. It aims to develop premium-quality wines from a specific Hungarian grape in uniform bottles for national and international markets. In order to do so, the wineries who are competitors and cooperative partners at the same time, needed to define the minimum standards of this special wine, and had to integrate their very different personalities, cultures, values, different reputations, business success and other resources. A professional jury consisting of 9 people was set up and each wine has to undergo a blind tasting procedure carried out by the members of the jury. Only wines that comply the necessary qualitative and quantitative requirements gain the right for marketing under the uniform bottles and labels.

2. Important innovations

The Roundtable works like a community of practices, in the sense that it is a partnership-based professional network of competing oenologists who are to set up commonly accepted quality standards for a barely known type of wine. By doing so, the Roundtable carries out a number of innovation activities. The Roundtable itself represents an organisational innovation. The members share with each other their knowledge on product and process developments. Many of them regularly cooperate with agricultural academic/scientific institutions in order to develop and preserve more valuable clones of the grape, which is a technological innovation. The oenologists also recognised the importance of marketing and they spend significant resources on the design of the uniform bottles and labels. The Roundtable also aims to educate the customers in order to increase the demand for the wine.

3. Key findings on interrelationships between innovation, job quality and employment

The Roundtable is an instrument for the oenologists taking part in the cooperation to enhance their turnover and profit, first on the national market, and later on the international stage. It obviously makes a positive impact on employment and in the case of a successful cooperation the number of employees in the wineries is likely to increase. In an optimistic scenario, wages will also increase and job security will improve. One of the most important points of cooperation is sharing the knowledge and experience of oenologists so that employees can also profit as they can gain job specific knowledge that can increase their value on the labour market, primarily due to on-the-job learning and informal trainings. In addition, if the owner oenologists learn to work together as a team, it may also have a positive impact on the organisational culture of the single wineries, strengthening autonomous teamwork and increasing the support received from both the supervisor(s) and colleagues.